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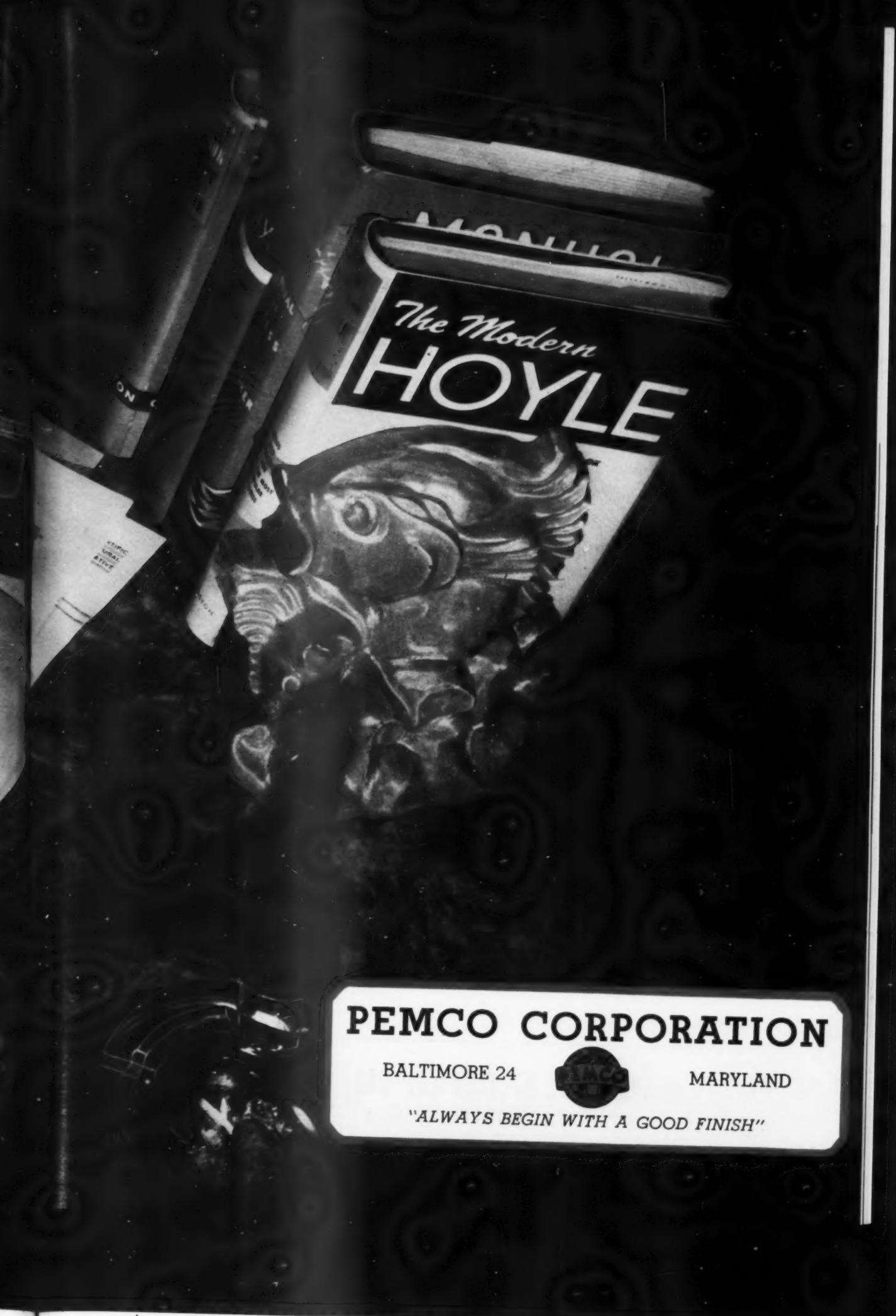

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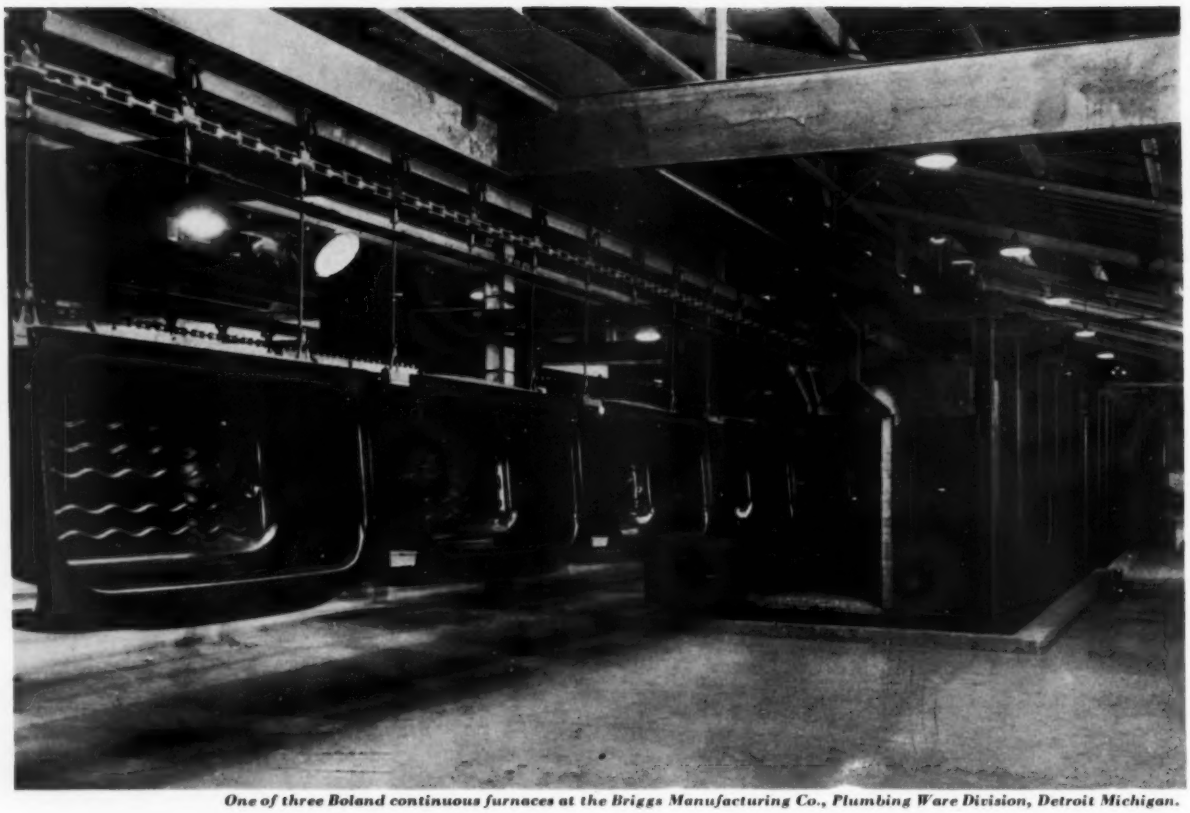

One of three Boland continuous furnaces at the Briggs Manufacturing Co., Plumbing Ware Division, Detroit Michigan.

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The BOLAND continuous furnace provides radiating surfaces on both sides of the ware, and has a pre-heat zone that raises temperature gradually, firing ware the way it should be fired.

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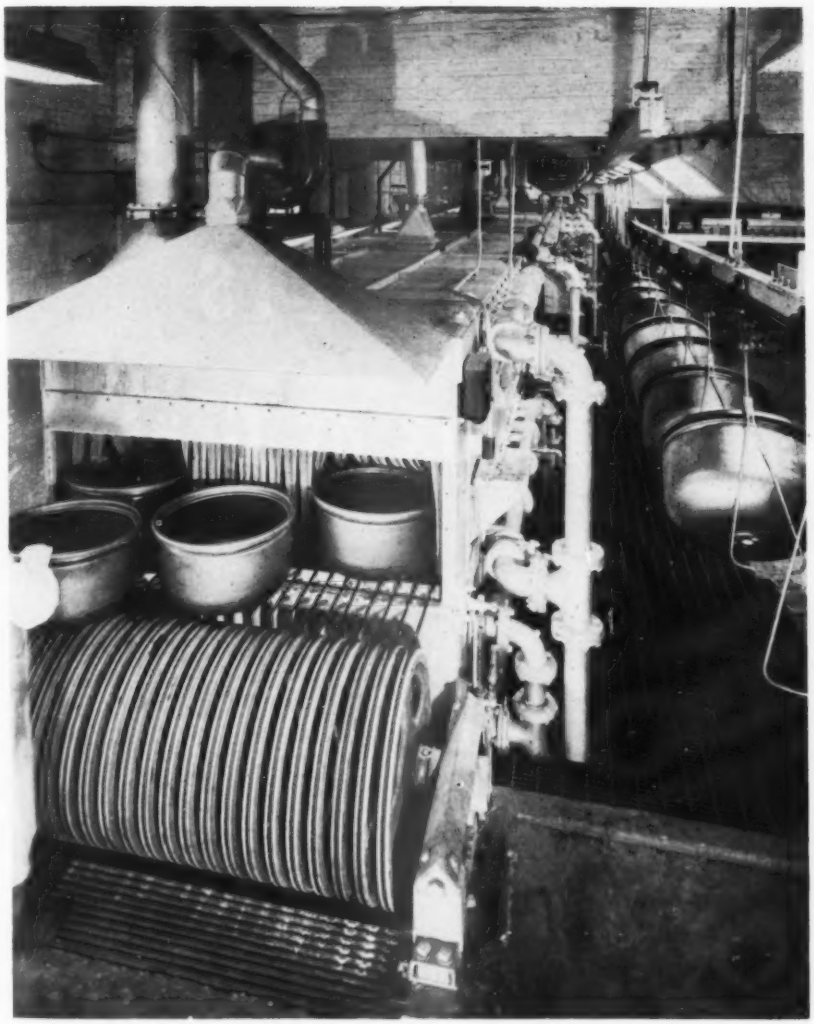
Designers and Builders of Continuous and Box Type Enameling Furnaces



New pickling machine at Benjamin Electric Mfg. Co., Des Plaines, Illinois

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means

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CONTROL for BETTER CLEANING • CONTROL for LOWER COST CLEANING

For better cleaning, drawing and cleaning processes must both be controlled. Vantrol Compounds and Vantrol Service provide that control—for compatible materials are selected to meet the requirements of the job.

For many years, Benjamin Electric Manufacturing Company has recognized the advantages of Vantrol Products and is continuing their use in a new continuous pickling machine. Vantrol Compounds are made exclusively by Van Straaten—a name long associated with the proper preparation of metal for porcelain enameling.

Vantrol Products and Vantrol Service can aid you too—*control with Vantrol.*

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LET'S HAVE A SANDWICH—You're not hungry? Then, let's have a beer, a coke, or anything to get us into the kitchen.

Why the kitchen? Because the average American kitchen represents the greatest past, and present, outlet for porcelain enameled products.

Let's talk sinks

Here is one place that porcelain enamel has more than held its own. Many attempts have been made to popularize the bright metals with such ideas as "the beauty of old silver," etc., but the fact remains that the housewife — the homemaker — wants a "gleaming white" sink in her kitchen. She wants a sink that looks clean, *is* clean, and is easy to *keep* clean. Dinginess and scratches are hard to sell to a "white conscious" and "clean conscious" lady of the house.

We urge that this market be protected by those who produce the porcelain enameled sinks. It will be best protected by building *only* first quality ware — whether cast iron or steel — ware with proper scratch and wear resistance, and, by all means, proper acid resistance. It's much less expensive to hold a market than to develop a new one, and this market definitely can be held if *all* manufacturers produce and sell the right kind of product.

Now about counter tops

We've "harped" on this subject before, and we will "harp" on it again until some kitchen-conscious producer with porcelain enameling facilities offers the home owner the ultimate in kitchen work surfaces — a good heavy plywood counter top with a light gauge porcelain enameled work surface veneered to the plywood.

In this suggested surface, the housewife could have everything that she desires. She could have a sound absorbent, colorful, *permanent* work surface that successfully resists heat, acids, scratching and wear. And — *very important* — she could enjoy these advantages without the effort of applying special liquids, waxes, polishes, etc., that are required to hold some semblance of the original appearance on less permanent surfaces.

Think it over

Here's a market we haven't touched. Surely, the sink is porcelain enameled — because no other finish can "take it." But, there are many more square feet of important work surfaces in the modern kitchen that are now being covered with less durable, substitute, and temporary materials because no one in the industry has, to date, deemed it advisable to develop a product to do the job.

It's the simplest possible construction we are suggesting. Use light gauge, flat sheets — enamel with a semi matte, acid resisting finish, in acceptable colors — veneer to plywood — finish edges with bright metal moulding, as in the case of materials used at present. Certainly, it's a "deluxe" job, but this type of surface, miles of it, is in daily use. Unfortunately, the surface finish in every instance is one of several competitive materials, not porcelain enamel. Let's do something about it now!

Dana Chase

EDITOR AND PUBLISHER

The DE VILBISS Sp

Outstanding Features of the DeVilbiss Pressure Feed Tank

1. Agitator shaft supported in over-size oil-impregnated bearings; easily accessible for oiling. Patented seal keeps material from entering bearing; vented channel prevents pressure build-up and forcing oil into material.
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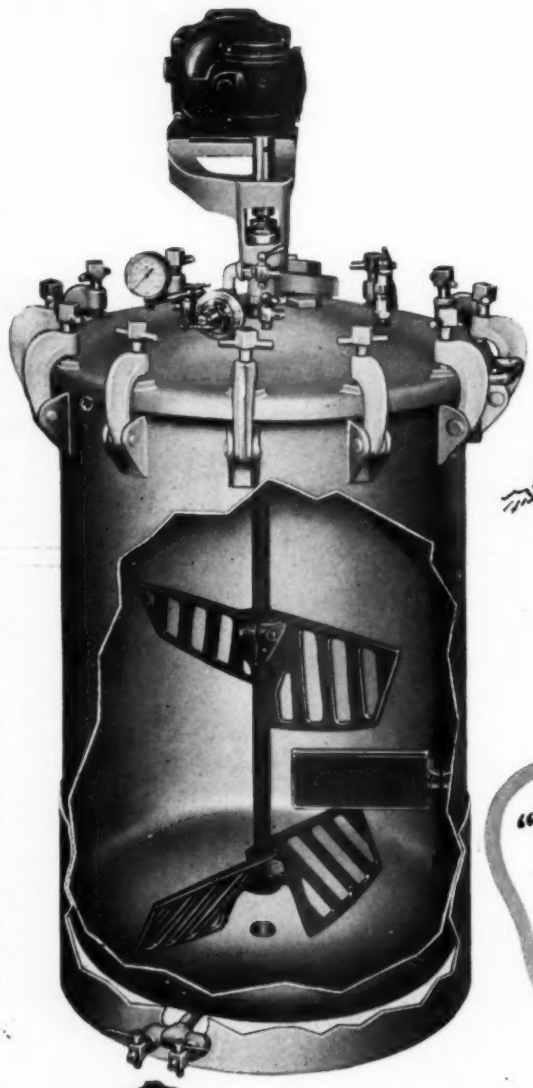
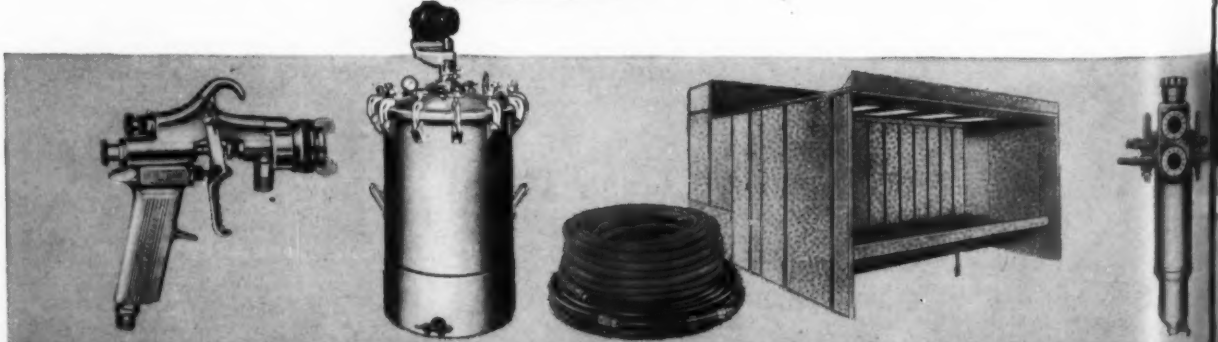
3. Heavy stainless steel agitator shaft.
4. Stationary agitator baffle prevents swirling and deflects material back into rotating agitators.
5. Lower of the two pitched and slotted agitator paddles insure complete, thorough mixing.
6. Tank shell drawn from heavy gauge corrosion-proof and wear-resistant metal.
7. Smooth sides and concave bottom easy to clean.
8. Pressed steel lid, heavily plated on the outside, spray coated with molten aluminum on the inside.





A COMPLETE DeVILBISS LINE DESIGNED AND BUILT FOR PORCELAIN ENAMELING AND CERAMIC FINISH

PRESSURE FEED TANK

Perfectly Mixed . . .

CLEAN MATERIAL AT THE GUN

. . . means fewer rejects

Result: No production delays—No losses due to inferior finishes—More beauty and increased sales appeal in the finished product. That's why it pays to depend on DeVilbiss pressure feed tanks designed specifically for the porcelain enameling and ceramic industries.

Examine the DeVilbiss construction features on the opposite page. They make the difference between ordinary tanks and DeVilbiss improved tanks that withstand the severe abrasive wear of vitreous spray materials. Here is assurance of extra long life, minimum maintenance attention and continuously efficient delivery of spray materials to the gun.

All the qualities that mean higher finishing efficiency for long periods are incorporated in the complete DeVilbiss Ceramic Line—from guns to spray booths. Your DeVilbiss Engineer will gladly show you how these DeVilbiss features increase production, improve product quality and lower operating costs.

THE DEVILBISS COMPANY • TOLEDO 1, OHIO

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This company fabricates AND enamels washing machine tubs

photo story and description of tub fabrication by welding and porcelain enameling in a box furnace plant

illustrated with finishfotos exclusively

By Dana Chase • EDITOR

finish

A trip through the Horton Manufacturing Company plant should be of interest to porcelain enamelers for at least two reasons. In the first place, Horton is probably the only manufacturer of washing machines that produces a fabricated-welded tub and follows through with the porcelain enameling. In contrast to the deep drawn tub common to the industry, this company fabricates the tub by rolling and welding the circular tub body and then welding on a stamped tub bottom. Secondly, porcelain enameling in this plant is a box-type furnace operation, while the majority of washing machine tubs produced today come from continuous furnace plants.

Horton is one of the oldest names in the washer-ironer industry, and the company has been fabricating its own tubs and doing its own porcelain enameling for many years.

During the war years, when this company, like all other washer manufacturers, was head over heels in war production (the company won five Army-Navy E awards), plans were being made for plant modernization which included conveyorizing the porcelain enameling facilities.

M. A. Naus, vice president in charge of production; T. Pinder, plant engineer; and Harry Chrisman, chief foreman of the enameling division, put their heads together during this period and the result in the enameling plant was the installation of a new conveyor system, completely new pickling room, a new electric enameling furnace (the company operates two furnaces) and an advanced inspection system.

The Horton machine uses a double wall tub. This means the "inside" tub fits within an outside "jacket."

Fabricating the tub

For the tub side, steel is sheared to size, rolled to shape, and then placed in a jig for the acetylene butt welding of the vertical seam to form the body. This tub body, or side, is then transferred to a second jig on which a screw clamp fits the circumference of the tub near the bottom

Photo story — pages 16 and 17

description continues on Page 18 →

LORD HALL LIBRARY

Welding tub bottom to side, with tub revolving under stationary tips.

After tub welding is completed, the welds are hammered with an electrically operated hammer for leveling the surface. Tub welds are then ground so that the resulting surface will be desirable for porcelain enameling.

After welds have been hammered and ground, the tubs are transferred to a spinning machine, such as the one shown here. After being clamped securely in the machine, spinning operation turns the top edge of the tub.

From the spinner in the preceding picture, tubs are placed on this rolling machine, where the top edge gets a forming operation and the beads are rolled in.

From the neutralizer tank, right background, cleaned and pickled tubs are transferred to a convenient elevated roller conveyor, which feeds this blower-heated, tunnel-type drier. See the unload end of this conveyor in the next photograph.

Spraying ground coat in stationary booth equipped with motor driven turntable. Tubs are fed at left from the conveyor shown in preceding photo. Operator transfers tub to overhead conveyor hanger in foreground.

This photograph shows tubs in bisque entering "U-type" tunnel drier. Harry Chrisman, chief foreman of the enameling division, points to the blower unit that serves this drier.

edge, holding the tub securely to the body of the jig. The fabricated bottom is then attached to the bottom edge of the tub side, and held in place with a second especially designed clamp.

The butt welding of the bottom to the side is accomplished through the use of an acetylene gas, 4-burner tip unit. The welding unit is stationary, while the tub revolves in the jig. The operator controls the weld through the adjustment of thumb screws.

To assure a smooth surface for porcelain enameling, the tub is then transferred to an electrically operated power hammer for leveling the surface of the vertical and bottom weld. It then goes to a polishing grinder to complete the development of a smooth, uninterrupted surface.

After tubs have been hammered and ground, they are clamped in a spinning machine and the top edge turned over to form the "lip" on the open edge.

The tub is next mounted on a horizontal rolling machine where the top of the tub is finally formed and the beads are rolled in. This completes the fabrication of the tub and it is then subjected to close inspection for size, welds, surface smoothness, etc., before being passed to the porcelain enameling department.

An eight-tank pickle room

The new pickle room houses eight tanks, consisting of two cleaners, one hot rinse, one acid, one hot rinse, one nickel, one hot rinse, and one neutralizer. A wooden canopy is mounted above the tanks, overhanging the tank installation at the ends. Three twenty-four inch exhaust fans serve this canopy.

Fabricated tubs are placed in baskets, which hold eight tubs each, and are carried through the pickling system by a manually operated monorail conveyor. The eight tanks have a capacity of 930 gallons each.

Within easy transfer distance from the unloading side of the neutralizer tank is an elevated roller conveyor which feeds a tunnel type drier of the proper size to take the pickled tubs and allow for ample air circulation around them. The tunnel drier is heated by a blower type gas unit which feeds the heated air near the entrance end of the tunnel, and recirculates from a point near the exit end.

Applying the finish

After leaving the drier, the tubs continue on the gravity roller conveyor to a point immediately adjacent to the ground coat spray booth. Enamel is applied in a stationary booth, equipped with motor driven turntable, and the tubs placed immediately (open end up) on a special base which is supported by a "C" shaped hanger.

The carrying tools are a part of an endless overhead monorail conveyor which serves both as conveyor for the continuous U-type enamel drier and as a service conveyor for succeeding operations.

The U-type tunnel drier, like the pickle room drier, is gas heated, employing a blower type unit for convection heating. Mr. Chrisman tells

to Page 56 →

Loading one of the two electric box-type furnaces in which ground coat and cover coat are fired simultaneously.

Metal preparation for porcelain enameling

with a new type spray-cleaning and pickling machine

mechanical details and processing data from equipment now in operation

By George Tuttle • CHIEF CERAMIC ENGINEER, BENJAMIN ELECTRIC MFG. CO., DES PLAINES, ILLINOIS

Exclusive feature finish

As the porcelain enameling industry continues to grow, more and more attention is being directed toward metal preparation. The control of all processes in a porcelain enameling plant is important for best end results, but the cleaning and pickling process deserves more attention than it has generally received.

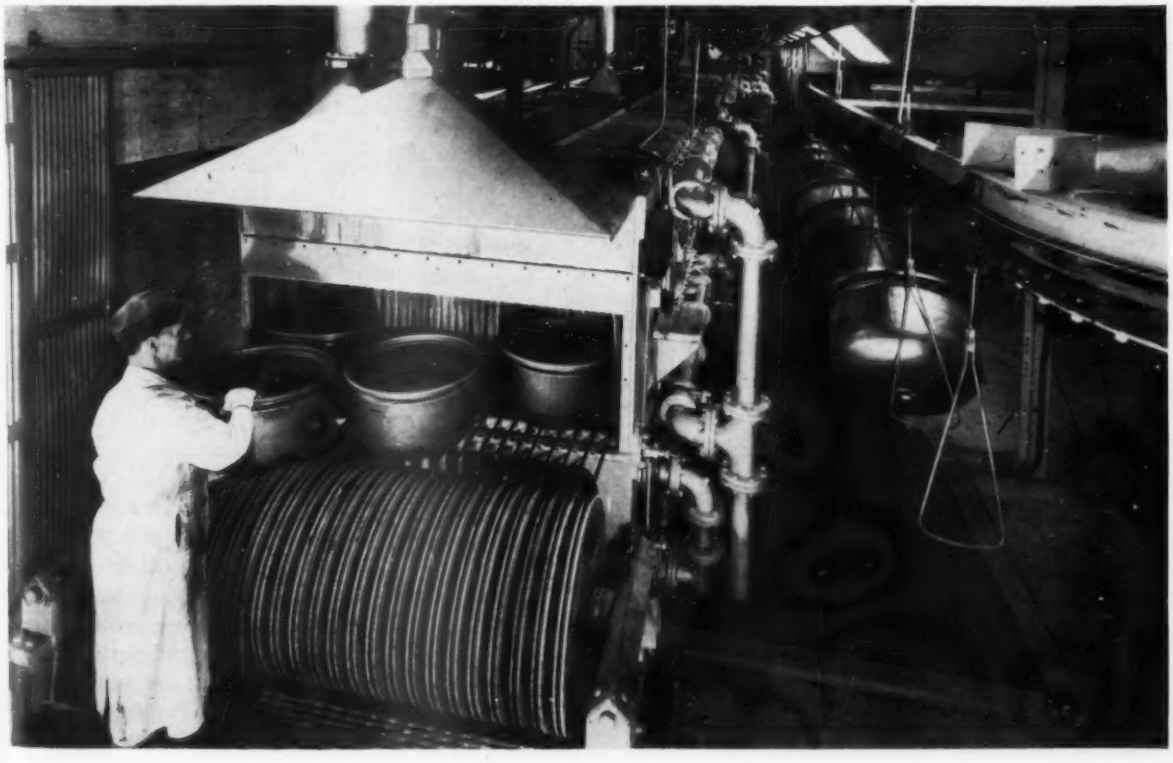
The cleaning and pickling problem involves, however, not only a chemical phase but, what is probably more important, a mechanical phase. Certain types of ware, by reason of the shape and design, are well adapted to immersion cleaning methods and can be handled economically and cleaned quite effectively in this manner. Other types of ware can not be *both* economically and effectively cleaned by immersion process.

Improved means of agitation in immersion tanks and the use of spray rinses in connection with arm type, grasshopper and other types of continuous machines represent one method of taking advantage of better mechanical action in the cleaning process. It seems likely that any outstanding improvements in cleaning methods may depend on better mechanical or physical action rather than entirely on improved chemical action. The pressure spray continuous pickling machine represents the most recent development in cleaning and pickling methods along this line.

Cable conveyor spray type pickling machine an English development

The automatic spray pickling machine now in use at the Benjamin Electric Manufacturing Company plant was designed, manufactured and installed by The B. F. Goodrich Company in conjunction with Curran Brothers, Ltd., Cardiff, Wales. Curran pioneered this type of equipment in their holloware enameling plant, since their machine was first devel-

This 95 ft. long cleaning and pickling machine has 1500 sq. ft. of conveyor area entering the machine per hour, with an approximate hourly output of 6750 sq. ft. of steel area when washing machine tubs are processed.



oped about fifteen years ago. Further experience was gained during the war, in both England and Canada, in the operation of spray pickling machines of this type for the production of cartridge cases and other war products.

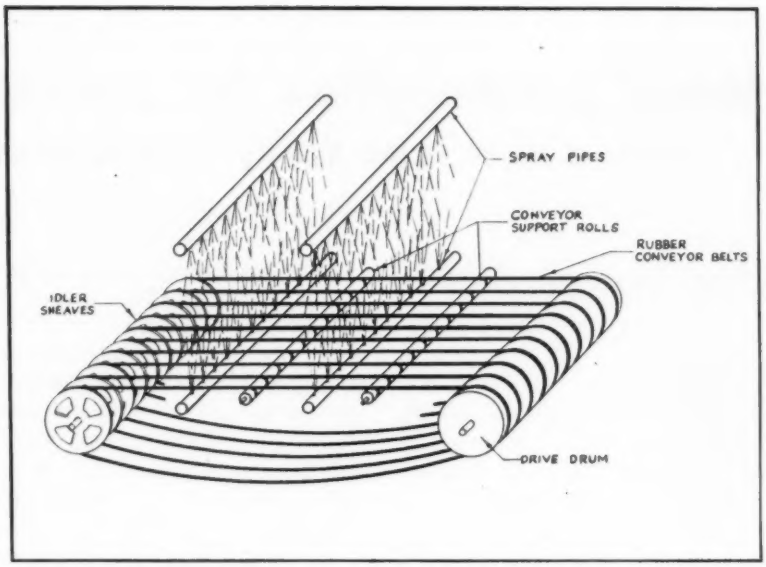
Mechanical details of the spray pickling equipment

The basic difference between this equipment and other spray type pickling machines is the conveyor. It consists of a series of rubber covered steel cables, driven by a 30″ diameter cast iron drum at the exit end, supported by individual idling sheaves at the entrance, and supported throughout the machine by rubber-covered, grooved rollers.

This conveyor passes through a series of tanks, placed end to end, which contain the solutions. Solutions are applied to the ware by means of high pressure sprays located above and below the conveyor.

The body of the machine forms a tunnel-like enclosure, through which this conveyor passes.

The Benjamin installation has a conveyor width of 6′-0″, operating at a speed of 4′-0″ per minute. Overall height of tanks is 5′-6″, and overall length of the machine is 95′-0″. At 4′-0″ per minute, about twenty-four minutes are required for the complete cycle. The length of time the ware is subjected to the solution sprays is controlled by adjustment of the conveyor speed, and temperatures of all hot solutions are automatically controlled. The entire machine is built over a 4′-0″ deep cement foundation pit, which provides return space for the endless cables and drainage for the entire system. A parallel section of the pit houses all pumps, motors and below-floor-level piping. Ready access to all mechanical equipment is provided by removable floor gratings.



This sketch shows the operating principle of the cable conveyor and the spray equipment.

Methods of handling corrosion problems

Problems of handling corrosive solutions in pumps, spray pipes, piping, etc., are met in a number of unique ways. The acid handling pumps are made of a special ferrous alloy, the nominal analysis of which is: nickel 29.00%; chromium 19.00%; molybdenum 3.00%; copper 4.00%; silicon 1.00%; and carbon .07% max.

This alloy has good resistance to the highly aerated 7% sulphuric acid at temperatures up to 180° F., such as encountered in this operation. Other places where it is considered highly desirable to use this alloy include test cocks, gauges, cable support roll journals, internal nuts and bolts, and strainer plates.

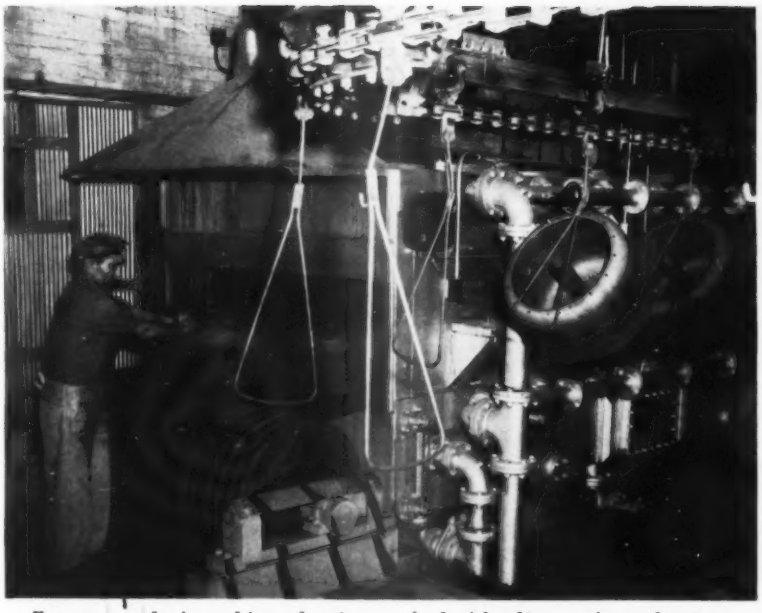
The spray pipes for handling alkaline solutions are wrought iron, while those for acid service are of a special asbestos-bakelite composition. Steam heating coils for acid compartments and pipes for introduction of concentrated sulphuric acid are of chemically pure lead. Practically all other acid handling problems are solved by the use of 3/16″ standard rubber linings. Compartments exposed to the corrosive condition are all equipped with either hard rubber or a sandwich of hard rubber between two layers of soft rubber. As an assurance of long life, the acid section, which may be subjected to higher temperatures, contains acid-resistant brick sheathing in addition to the rubber lining. Cable support rolls are rubber covered, and re-circulating drain piping is rubber lined.

The conveyor cables, which are exposed to the extreme conditions of the alkali cleaner and neutralizer to the sulphuric acid, and temperatures from perhaps 50° F. outside the machine to 220° F. in the drier, also

Comparison Table

Time and Temperature Cycle of Cleaning and Pickling Operation

		Automatic Cycle		Former Immersion Cycle	
Section	Solution	Temp. ° F.	Time	Temp. ° F.	Time
1	Alkali C	180	3′ - 0″	212	20′
2	HW Rinse	160	1′ - 20″	185	2′
3	CW Rinse	Cold	0′ - 47″	None	—
4	7% H_2SO_4	160	4′ - 15″	150	12′
5	CW Rinse	Cold	0′ - 47″	Cold	2′
6	HW Rinse	160	1′ - 20″	None	—
7	Nickel Sulfate	160	3′ - 0″	150	7′
8	Acid Rinse	Cold	0′ - 47″	Cold	2′
9	Neutralizer	140	2′ - 5″	160	4′
10	Drier	200	———	200	—



Entrance end of machine, showing method of loading perforated spinner tubs on rubber covered steel conveyor cables.

present a problem. In addition, a tensile strength of 1500-2000 pounds for each cable is necessary. These requirements are met by the use of 3/16" diameter, 7 x 7 preformed aircraft cord (steel cable) onto which is extruded a 3/16" neoprene cover. Each individual cable is spliced after positioning in the machine, the splice being protected by a vulcanized section which becomes an integral part of the original covering.

The cleaning and pickling cycle with the pressure spray machine is essentially the same as in the immersion tank method, except that the concentrations, times and temperatures are somewhat lower as indicated in the accompanying table.

Cleaning

The cleaning operation is accomplished through the use of a non-foaming alkaline cleaner in a single stage at a strength of 1 oz. per gallon. All areas are brought into contact with the cleaner, either by direct or indirect impingement of the sprays. Removal of all cleaner and soil is accomplished as the ware leaves the cleaner section by employing a hot re-circulating spray rinse with a constant overflow. Thus, the carryover of hard water soaps or soil, so often encountered with ineffective cleaning methods, is prevented. Further protection is provided by using a second non-recirculating cold spray rinse. The effects of poor rinsing action and subsequent enameling defects are well known to all enamelers.

Acid pickling

The use of pressure sprays for acid pickling provides aeration of the acid, and the fact that removal of spent acid is constantly taking place at the surface of the metal results in the reduction of pickling time.

In our plant, we have a considerable volume of production where an annealing operation is required prior to later drawing operations. When ware is pickled by immersion, for the removal of the resultant annealing scale, hydrogen embrittlement is often encountered. The reduction of pickling time by the spray method reduces or eliminates this hydrogen embrittlement.

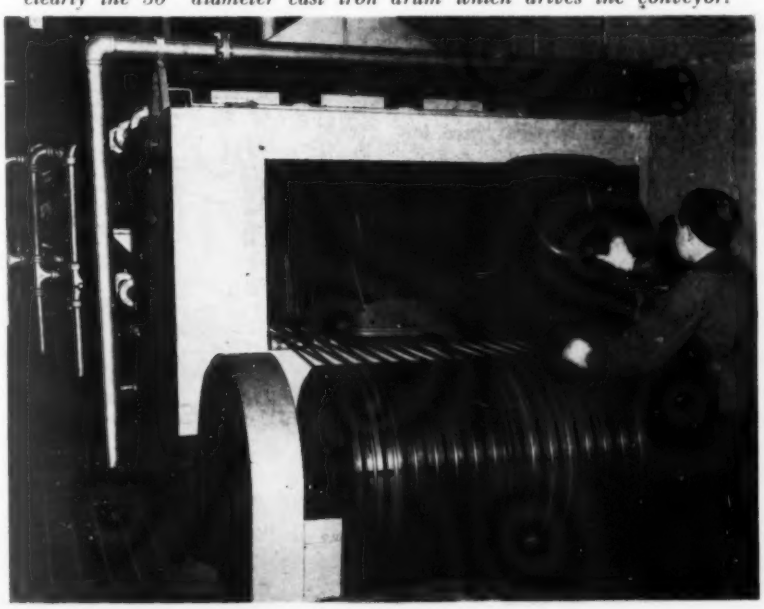
Complete and thorough rinsing of acid is accomplished by the use of a cold, non-recirculating rinse, followed by a hot, recirculating rinse.

Nickel flash

Originally, the nickel section was utilized as a second neutralizer. Experimental work on the application of nickel is now under way, and nickel determinations on a number of production parts indicate a satisfactory and uniform nickel deposition. The nickel tank has a filter for continuous operation in the removal of all solids.

The acid rinse following the nickel is provided for the removal of iron salts from the ware. In the continuous spray pickle, there is little opportunity for the formation of these iron salts since the ware passes directly from the nickel section to the

Exit end of machine, showing square tubs leaving drier. Photo shows clearly the 30" diameter cast iron drum which drives the conveyor.



acid rinse section and remains in a saturated atmosphere. This condition is not conducive to the formation of troublesome iron salts which may be the case in immersion pickling where the ware may start drying during the transfer periods.

Water at supply temperature is delivered to the nickel rinse tank and a slight overflow is maintained. Control of the pH on the rinse is accomplished by a constant supply of sulphuric acid from an overhead storage bottle.

Neutralizer

In most cases the alkalis normally used for neutralizers can be used in the pressure spray machine. A filter is provided on the neutralizer section and is operated continuously to remove all contamination.

Drier

The drier section is heated with steam coils, and a blower is incorporated for the circulation of the hot air. A fabric curtain at the exit end of the drier serves as a partial heat seal. It might be well to mention here that between each of the spray sections in the equipment a flexible rubber curtain is installed to minimize carryover of solution spray.

Capacity directly proportional to type of ware run

The capacity of the equipment varies with the design or shape of the parts being pickled. In the Benjamin machine, approximately 1500 square feet of conveyor area is available per hour. Capacity will be governed by the ratio of the area of the ware to the conveyor area required for the particular ware. For example, a washing machine tub with approximately 18 square feet of area to be enameled requires 4 square feet of conveyor area, or, in other words, 4 - ½ square feet of tub area per square foot of conveyor area. Capacity of the machine for this item is, roughly, 4 - ½ square feet x 1500, or 6,750 square feet per hour.

On different types of incandescent reflector shapes, this figure may vary from 2,000 square feet to 4,000 square feet per hour, with the average about 3,000 square feet per hour for the reflectors we run. It will be clear that the capacity will change with every type of ware.

Some idea of our requirements for versatility in a machine of this type can be seen in the fact that our parts vary from small 6″ diameter incandescent light reflectors, through a complete line of several hundred different reflector shapes, to washing machine tubs as large as 25″ square by 22″ high.

As volume and type of ware are governing factors in determining the use of this type of equipment, it will be recognized that the adaptation of a spray pickling machine for economical cleaning and pickling involves two important considerations: (1) The volume of ware to be cleaned must be sufficient to warrant the initial installation cost and to insure operation at the machine capacity. (2) Design and shape of fabricated parts to be enameled should be studied to prove their suitability for this type of equipment, and so that the machine can be designed to the best advantage. Assuming that these two points have been considered to the point of justifying such an installation, there are definite advantages to be expected.

Possible advantages

Laboratory and plant tests conducted during two months' operation of our machine show a ground coat bond which compares favorably with that obtained under the best conditions of immersion pickling, and a bond that is more uniform from day to day.

Solutions applied by pressure sprays are accessible to all surfaces of the ware, since ware moving on the flexible cables has no opportunity to become "masked" by other ware

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"Hello, Ajax Porcelain Co.? About that Cleaning and Pickling School you sent my husband to. It sure was!"

The properties of porcelain enamel
and their effect upon enamelware

By H. D. Carter, B. W. King and H. C. Draker

THE HARSHAW CHEMICAL COMPANY, CLEVELAND, OHIO

Part II

SECTION III. STUDY OF EFFECT OF VARIOUS CONDITIONS

Exclusive feature finish

1. Fusibility of the ground coat

Although there was no indication from the results obtained with G1, G2, and G3 that the fusibility of the ground coat might influence the results, it was decided to make an additional check on this point. To this end, frits G4 and G5 (Table II, Section I) were made, having the same calculated expansion as G3 but with different fusibilities. As determined from firing range tests, G3 was soft, G4 intermediate, and G5 was hard. Over this range the surfaces of both G4 and G5 were not as good (Table III, Section I) as that obtained from G3.

Pans were prepared in the usual manner, lots 18-21, and all firings were made at the suitable temperature and time as determined from the results of the firing range trials.

Thermal shock

The results as shown in Table VI (Section II) do not indicate a definite trend. The average thickness for all lots is within a narrow limit and the corresponding results for thermal shock are about the same for G3 and G4 and appreciably lower for G5 and a blend of G3-4-5. The firing treatment of G5 was somewhat high for the cover coats but the results from a later series, lots 30-34, show that this does not tend towards lower values. With both G5 and G3-4-5 the surfaces were the least satisfactory of any obtained in this investigation, and this condition is believed to be largely responsible for the lower results obtained. The surface in both cases tended to be rough, more from a boiling action than from refractoriness, and appeared that it would be weak mechanically.

Later, when working with G4 in Blend D (Section V), it was found that harder firing treatment would give a smooth surface, although this same treatment tended to produce rougher surfaces when used with the individual enamels G4 and G5 (Table III, Section I).

Impact

The values for impact resistance fall within a narrow range although there is some difference in the average bottom thickness. With G5 there is not the usual gain in impact resistance for the indicated increase in thickness. This may be due to the inferior surface condition as described under thermal shock.

Evaluating the results obtained in this series for both thermal shock and impact resistance with the results from a later series, fusibility alone does not control these properties. This statement appears correct, providing that in each individual case a good practical working surface is produced.

2. Firing treatment

In order to check this treatment, a blend was made by mixing equal parts of G3, G4, and G5. This was done so as to obtain an enamel which could be fired over the same range as the individual enamels had been and yet have satisfactory adherence for each of the three firings. Again in this series, the surface at all firings was not entirely satisfactory but any effect upon the results should be comparable.

Lots 22 to 24 were made for this series and tested.

Thermal shock

These results are also given in Table VI (Section II). Including the value for lot 21, both the average thickness and corresponding thermal shock results are within a narrow range and would indicate that firing treatment over a rather wide range has little or no effect upon thermal shock. This range will undoubtedly vary with different enamels but in the present case it represents a spread of 60° F.

Impact

The impact results for this series is within a narrow range as is the thickness. Hence, there is no apparent correlation between impact resistance and firing treatment within a practical limit.

3. Firing treatment of cover coat

Lots 30 to 32 (Table VII) were made to check the effect of cover coat firing. In order to improve the surface condition which had been obtained from the blend G3-4-5, a new blend which consisted of 20 parts of G1, 40 parts of G2, and 40 parts of G3 were used. This blend gave a much improved surface and had good adherence over a wide range (Table IV, Section I).

As this work progressed, pans were occasionally checked for adherence. It was noticed that usually bonding was good across the bottom of the pans and up the sides, but poor for

TABLE VII.

THERMAL SHOCK — IMPACT

VARIABLE FIRING FOR DIFFERENT COATS: DIFFERENT STEELS

Lot	Steel	Firing			Inside Thickness	Thermal Shock	Outside Thickness	Impact
		Ground Coat	1st Cover	2nd Cover				
30	A	1600-4	1600-4	1600-4	9.8	12.0	11.2	12.5
31	A	1600-4	1550-4	1550-4	11.2	11.0	11.2	12.7
32	A	1600-4	1550-4	1500-4	10.2	12.2	11.6	12.6
30	A	1600-4	1600-4	1600-4	9.8	12.0	11.2	12.5
33	B	1600-4	1600-4	1600-4	13.0	11.5	12.2	13.5
34	C	1600-4	1600-4	1600-4	12.6	10.0	13.0	10.3

Blend A: G1-20, G2-40, G3-40; First Cover: C-3; Second Cover: C-1.

Firing temperature and time were increased until a good bond was obtained on bottom radii. Bonding takes place earlier on sides and bottom of pans.

Fire pans for each test. Only two results used on Lot 34 thermal test due to spinners

TABLE VIII.

THERMAL SHOCK — IMPACT

GROUND COAT BLEND, BOND VARIABLE

FIRING, COVER COAT CONSTANT

Lot	All Firing	Blend	Bond	Inside Thickness	Thermal Shock	Outside Thickness	Impact
35	1540-3	A	Good — except at radii	12.8	9.4	14.5	14.1
36	1540-3	B	Good — except at radii	11.5	11.0	11.8	13.7
37	1540-3	C	Poor	12.4	7.8	12.2	12.4
38	1540-3	A	Good at all points	12.3	10.2	12.6	13.1
54	1540-3	C	Good at all points	14.4	7.6	13.3	14.2

Ground Coat:	A	B	C	First Cover:	C-3
G-1	20	40	40	Second Cover:	C-1
G-2	40	20	40	Steel:	A (Steel B was used on Lot 54)
G-3	40	40	20		
Exp.	298	294	288		

Lots 38 and 54 were given a nickel flash. Solution 2 oz. single nickel salts, ¼ oz. boric acid per gallon. 160° F. for 6 minutes.

Five pans for each test.

TABLE IX.

THERMAL SHOCK — IMPACT

OUTSIDE BOTTOM THICKNESS VARIABLE

Lot	Outside Bottom			Inside Thickness	Thermal Shock	Outside Thickness	Impact
	Blend A	C-3	C-1				
43	Heavy	Reg.	Reg.	12.0	9.0	13.8	10.5
44	Reg.	Heavy	Reg.	11.3	9.0	14.4	13.4
45	Reg.	Reg.	Heavy	12.1	8.6	16.0	11.6

Ground Coat: Blend A; First Cover: C-3; Second Cover: C-1; Steel: B
All Firings: 1540° F. — 3 Minutes; Five Pans for each test.

a section of about one inch around the bottom radius.

In this series, Table VII, the firing treatment was increased until good bonding took place along the entire cross section of the pans. The cover coats were then fired at a combination of temperatures.

Thermal shock

Cover coat firing does not seem to influence thermal shock resistance.

Impact

Resistance to impact is not affected by cover coat firing.

4. Different steels

Using lots 30, 33, and 34 (Table VII), three different steels were tested using Blend A for ground coat.

Thermal shock

The bottoms of pans made in Steel C definitely had more tendency to sag and become "spinners." The thermal results for this steel are somewhat lower but it is believed that this is due to the condition of the bottoms and only having two samples which were not "spinners."

Impact

The result for impact is also lower for Steel C. It is difficult to know whether or not the tendency for the bottoms to sag might influence this result to some extent. Judging this phase over all the work done, there is no evidence that steel in itself will affect impact results.

5. Variable bond – ground coat blends

The possibility of one member of a blend controlling the results is covered in the series consisting of lots 35-38. Three blends were used consisting of different proportions of G1. G2, and G3. An effort was also made to determine the effect of bonding upon the results. This was done by firing the different blends at the same time and temperature rather than under conditions best suited for each blend. Lot 38 was also given a nickel dip in order to improve the bonding property of the ground coat.

The bonding results were as fol-

lows: lot 35, good at all points except radii; lot 36, about the same as 35; lot 37, in general poor and far below practical standards; and lot 38, good at all points. After final cover coat firing bonding was approximately in the same order, with 35 showing good bonding along cross section of pan, fracture on radii having good bond with small bright area in center, fracture was well tapered back; 36 was very much like 35 with a smaller area of bright metal showing; 37 bonding not nearly as good as with 35 and 36, fracture was larger and bright over entire area; and in the case of 38, bonding was very good at all points.

The results for this series are given in Table VIII. Later lot 54 was included in this series. This lot was made to determine the effect of improved bonding over lot 37.

Thermal shock

With lots 35, 36, 38 and 54, bonding was good across the bottom and up the sides, while with lots 38 and 54 it was better than usual at the radii. The adherence and bonding, in the case of lot 37, was definitely below practical standards at all points.

A perusal of the results show that there is no close relationship between the bonding property of the ground coat and thermal shock values. Disregarding a small difference in thickness, the values for lots 35 and 38 are very close even though there is a marked difference in bonding at the radii; also for lots 37 and 54 thermal shock resistance is practically the same although adherence and bonding is greatly improved in lot 54.

From these data, a single frit member does not appear to control the properties of the blend and there is no pronounced effect of either adherence or bond upon thermal shock resistance. The lower results for both lots using Blend C are probably due to the ground coat expansion being somewhat lower and to the fact that this particular blend, even though it had good adherence in lot 54, was not as well fired at 1540° F. for 3 minutes as were Blends A and B, thereby causing a structurally weak surface such as mentioned in Part I of this section.

TABLE X.

THERMAL SHOCK — IMPACT

GROUND COAT EXPANSION VARIABLE: INCREASED THICKNESS

Lot	Ground Coat	1st Cover	2nd Cover	Firing	Inside Thickness	Thermal Shock	Outside Thickness	Impact
26	G-1	—	—	1540-3	—	—	4.1	3.9
26-1	G-1	C-3	—	1540-3	—	—	9.4	9.5
26-2	G-1	C-3	C-1	1540-3	—	—	15.2	13.4
27	G-2	—	—	1560-3	—	—	3.8	3.5
27-1	G-2	C-3	—	1560-3	—	—	9.6	7.4
27-2	G-2	C-3	C-1	1560-3	—	—	15.1	13.8
28	G-3	—	—	1500-3	—	—	4.7	4.7
28-1	G-3	C-3	—	1500-3	—	—	10.4	10.1
28-2	G-3	C-3	C-1	1500-3	—	—	16.6	13.8
29	Blend A	—	—	1540-3	—	—	5.1	5.0
29-1	Blend A	C-3	—	1540-3	—	—	10.4	10.7
29-2	Blend A	C-3	C-1	1540-3	—	—	16.6	15.4
39	G-1	—	—	1540-3	2.6	14.5	—	—
39-1	G-1	C-3	—	1540-3	9.3	7.5	—	—
39-2	G-1	C-3	C-1	1540-3	12.3	8.0	—	—
40	G-2	—	—	1560-3	4.2	14.5	—	—
40-1	G-2	C-3	—	1560-3	10.1	6.3	—	—
40-2	G-2	C-3	C-1	1560-3	13.3	7.5	—	—
41	G-3	—	—	1500-3	2.6	15.0	—	—
41-1	G-3	C-3	—	1500-3	7.7	12.5	—	—
41-2	G-3	C-3	C-1	1500-3	11.3	12.0	—	—
42	Blend A	—	—	1540-3	3.4	15.0	—	—
42-1	Blend A	C-3	—	1540-3	7.7	9.5	—	—
42-2	Blend A	C-3	C-1	1540-3	11.4	9.8	—	—

Lots 26 - 29: Steel A; Lots 39 - 42: Steel B
Results: Impact 5 pans, 10 spots per pan
Thermal shock 4 pans, in most cases due to spinners.

Impact

The large difference in resistance to impact which was expected was not obtained. The results from lot 35 are somewhat higher than from lot 38, but the coating is appreciably heavier. The results on lot 37 are lower but not nearly as low as was originally expected. It should be noted that the impact value for this blend is higher in lot 54 but there has also been an increase in thickness.

These data indicate that impact resistance as measured by this test does not depend upon the bonding property of the enamels. Thickness of coating continues to appear to be the controlling factor.

It is thought that the usually poor bonding on the bottom radius is due to some extent to a cold polishing that the metal receives at this point during the drawing operation and it may be possible to take measures to avoid producing this condition. Although there is apparently no connection between enamel bonding and resistance to impact, there may be the psychological point to consider: "Does a consumer consider ware giving a bright fracture to be of poorer quality than ware giving a well bonded fracture?"

6. Irregular practice

Certain variations from normal practice were investigated in lots 43 - 45. In this series the outside bottoms were made extra heavy in each of the three enamels. At first this was done by redipping the pans which had been completely shaken back into the enamel. After running a portion of the pans in this manner, it was found that the extra enamel could be applied easier and more evenly by spraying so this method was used for the remainder of the pans.

Thermal shock

The results which are given in Table IX indicate that the thickness

Pages 26 & 27 for Fig. VIII, IX, X & XI
SECTION III continues on Page 28→

FIGURE VIII

Thermal Shock

Variable Ground Coat Expansion, Thickness, Firing — Cover Coat Constant — Steel B

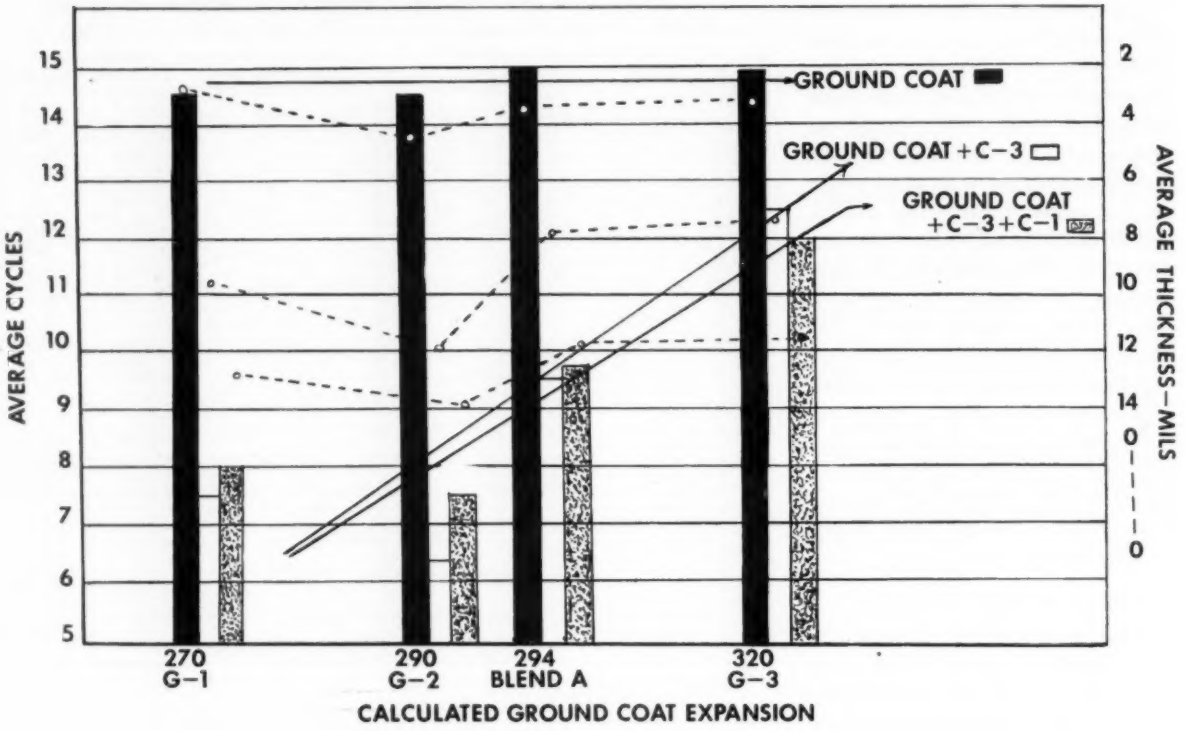


FIGURE IX

Impact Resistance

Variable Ground Coat Expansion, Thickness, Firing — Cover Coat Constant — Steel A

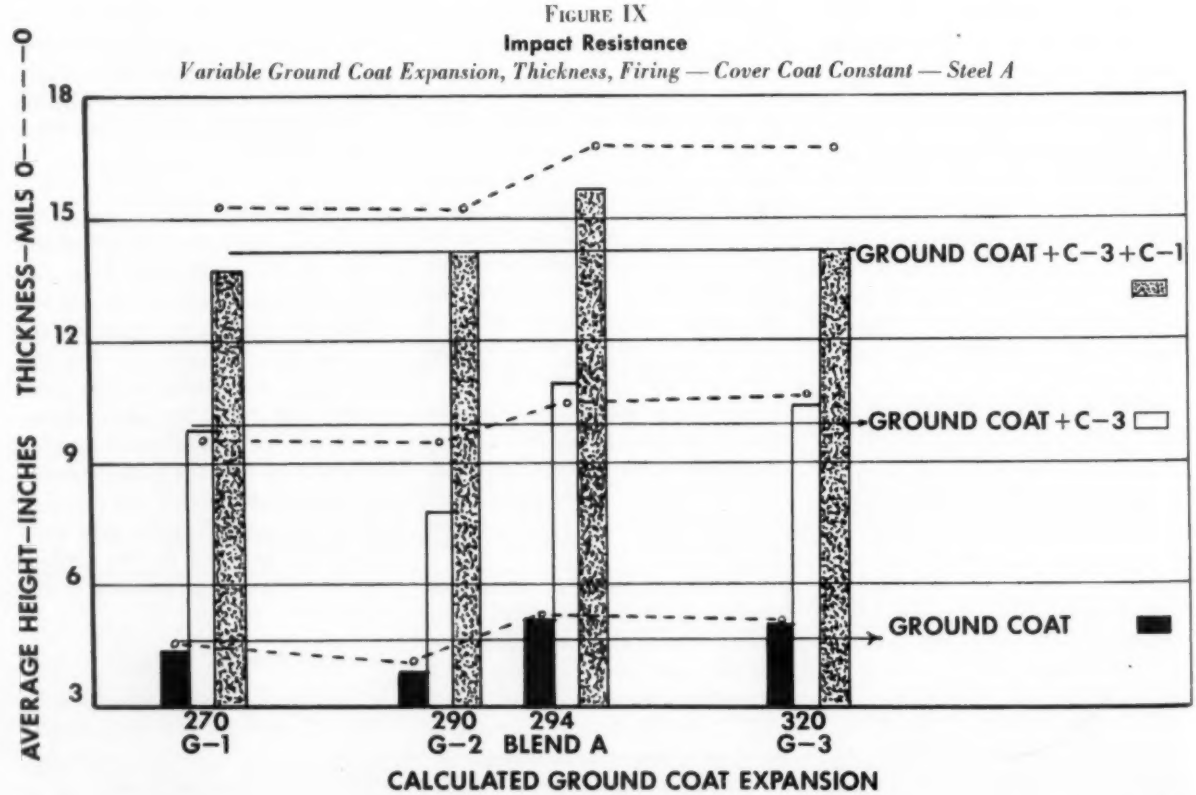


FIGURE X

Thermal Shock vs Enamel Thickness

Variable Ground Coat, Firing, Steel — Cover Coat Constant: First Coat C-3, Second Coat C-1

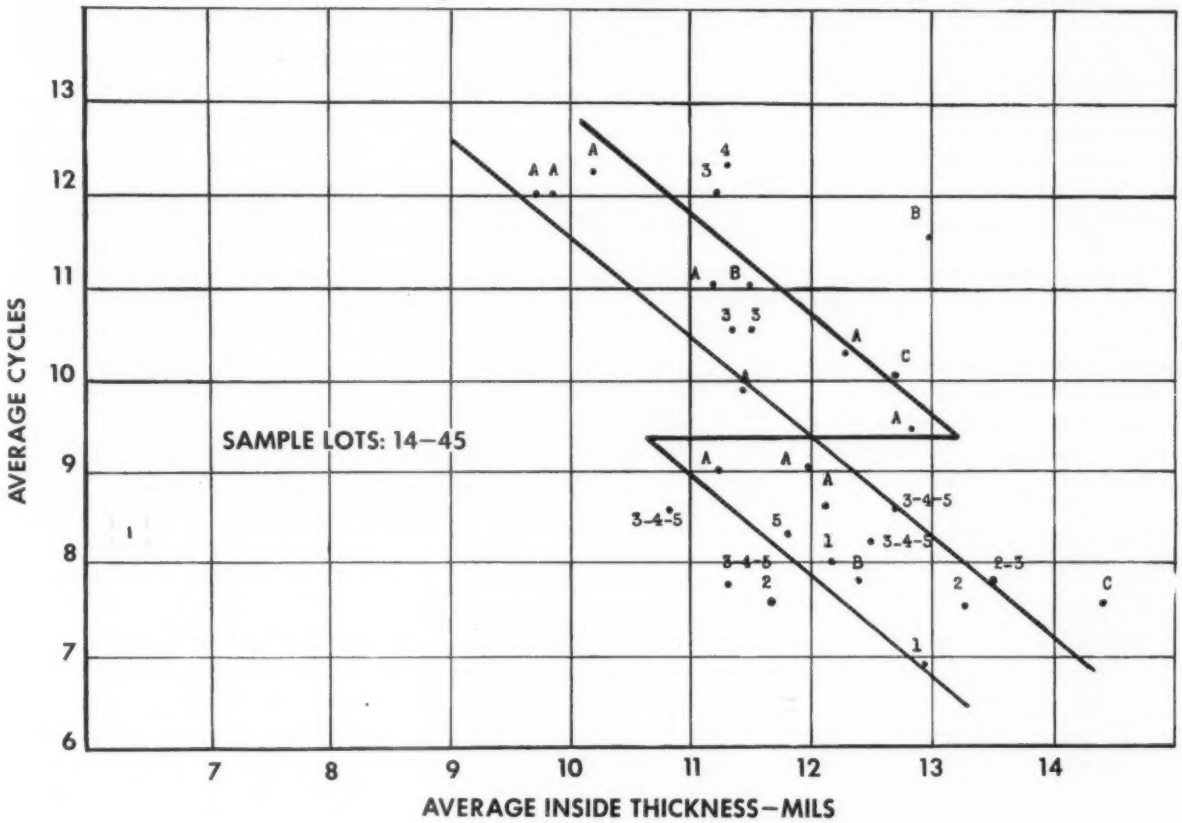
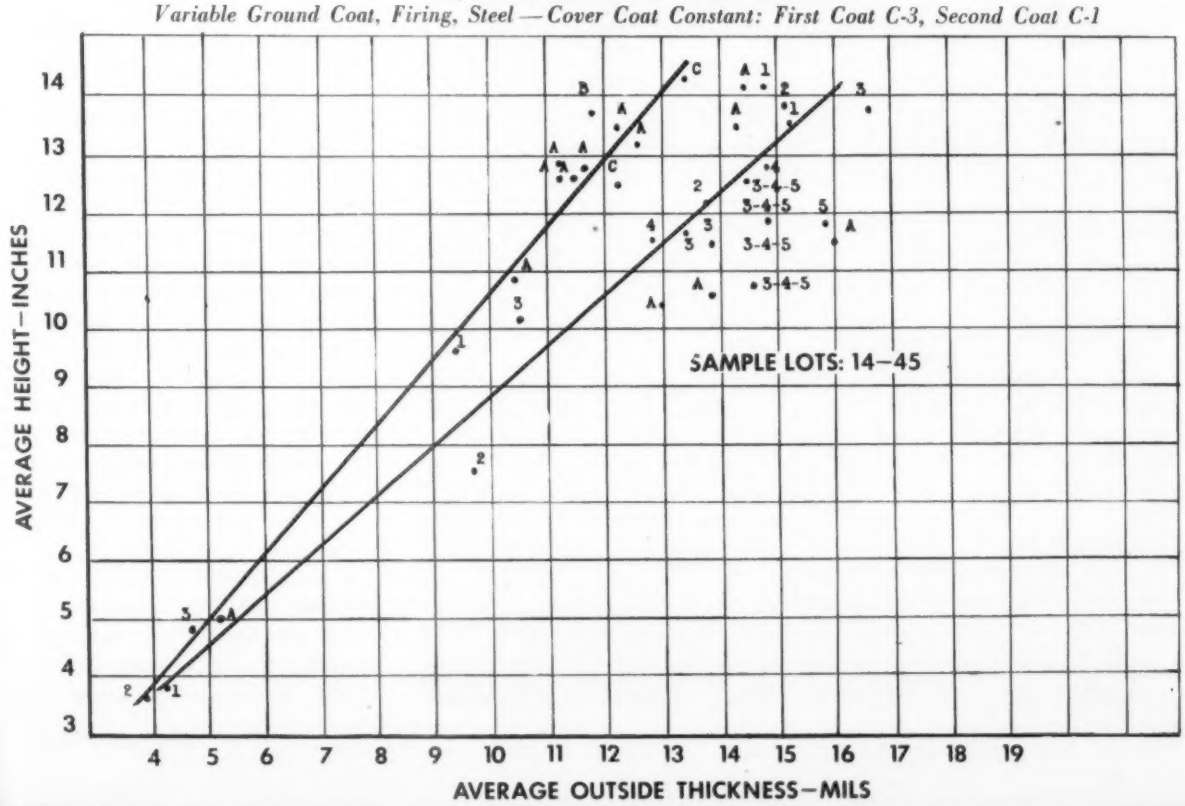


FIGURE XI

Impact Resistance vs Enamel Thickness

Variable Ground Coat, Firing, Steel — Cover Coat Constant: First Coat C-3, Second Coat C-1



of the outside bottom has little or no effect upon thermal shock resistance.

Impact

There is no significant trend as to the effect of outside bottom thickness of an individual coating upon impact resistance. In this series there is not a particularly good correlation between thickness and impact, and the results are somewhat inconclusive. This difference could easily be due to the variation between the measured bottom thickness and the actual thickness at the radii which would undoubtedly be greater in this series than in one in which the coatings were more normal.

SECTION IV. COMBINED EFFECT OF THICKNESS AND EXPANSION

1. General considerations

In Section II preliminary data were given concerning the effect of the thickness of coating and the expansions of the enamels used upon resistance to thermal shock and impact. It was shown that these two factors had a very important effect upon both properties.

Before proceeding to more complete consideration of this relationship, a study was made of various conditions that might influence the results. This was done in Section III where both enamel and practice variations were studied. It is to be realized that the results were limited to one set of samples but it is important to note that in no case was there any definite indication that variations which were more or less in a normal range had a direct bearing upon the results. In reviewing the work which has been done, there does not appear to be any requirement which would not fit in with what might be considered good shop practice. It is believed that the manner in which the industry approached the problem of standards is responsible for this condition and is the result of developing standards and methods from plant produced ware.

The individual effects of both expansion and thickness have been studied, as mentioned, to some extent. However, since variation in thickness may offset changes in expansion, it becomes necessary to study the influence of both factors simultaneously.

2. Thickness and expansion vs. results

Lots 26 - 29 and 39 - 42 were made to show the combined influence of the factors, thickness and expansion, which have been found to be most important in their effect upon both thermal shock and impact resistance. In this series, tests were made upon a single coating of ground coat, upon ground coat with a single cover coat and upon ground coat with two cover coats. The ground coats used covered a range of expansions while cover coats C1 and C3 were used. These enamels (Figure V, Section II) had given the best thermal shock resistance considering thickness in the preliminary tests. The results are given in Table X, and are shown graphically in Figures VIII and IX.

Thermal shock

These results, Figure VIII, are very interesting. They show: (1) that for a single coating of ground coat the resistance to thermal shock resistance is high and within the limits of the test no influence of expansion is shown; (2) there is a pronounced decrease in resistance with the application of the first cover coat, the decrease being less marked with higher ground coat expansions; and (3) there is little or no change in resistance with the application of the second cover coat having the proper expansion.

The results for G-1 in this series appear to be somewhat high considering previous results (Table VI). However, a definite trend of increased thermal shock resistance with increased ground coat expansion is clearly indicated. The importance of the proper relationship between cover coat expansions is illustrated. The usual decrease in resistance was obtained in all cases with the increase in thickness of the first cover coat but it is shown that further increase in thickness can be compensated by proper adjustment of final cover coat expansion. Actual measured thickness is also indicated for the various coatings by the dotted lines in Figure VIII.

Impact

The resistance to impact is shown in Figure IX. It is low for the single ground coating, increases with the application of first cover coat and again increases with the addition of the second cover coat. There is no apparent effect of expansion upon this property. Here again, thickness of coating appears to be the controlling factor. The fact should be noted that in the case of the blended ground coat the results are higher for all coatings. This condition will be discussed later. Actual thickness is again shown by the dotted lines.

3. Thickness vs. thermal shock resistance

In preparing lots 14 - 45 to check variations in both enamels and practice, the ground coats varied over a wide range while the cover coat combination of C1 over C3 was used in all cases. If the thermal shock values for these samples are plotted against thickness, we have Figure X. The ground coat used in each case has been designated at the point representing the value obtained. Thus, we have data concerning ten different ground coats and a wide range of practice variation.

It is quite noticeable that the points divide themselves into two groups included between the lines as drawn. In the lower group, thermal shock resistance increases with decreased thickness until we reach the values obtained from samples using Blend A as the ground coat. With this blend, it is significant that an appreciable variation in thickness occurred without too much effect upon thermal shock results. In Figure X this trend is indicated by the horizontal line to the right. In the upper group thermal shock resistance again increases with decreased thickness.

Considering the range represented by these data, it is remarkable that the results present the consistency that they do. The results for Blend B

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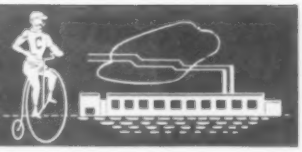
QUICK TRIPS TO ENAMELING PLANTS



A visit to Smoot Holman Company

By GILBERT C. CLOSE

Clement Smoot

Leonard Hobbs

George Holman

WE dropped in at Smoot-Holman Company recently, not knowing exactly what to expect as this was a first visit to the Inglewood, California, enameling concern. Imagine our surprise when we found ourselves engulfed in a seven-acre plot of modern factory buildings, each jammed from entrance to exit with the various paraphernalia, machines, ovens, pickling rooms, etc., required to turn out high quality enameling products.

We were a bit abashed at first, as our visit had been unannounced but genial Leonard A. Hobbs, general sales manager, soon erased that feeling. Hobbs is a magazine contributor himself, so he undoubtedly knows how a writer feels when he enters a strange place and asks for a lot of information. Introductions were followed by a pleasant visit with Clement E. Smoot, president, and George W. Holman, vice-president, and then by a tour through the plant.

From a modest beginning in 1915, Smoot-Holman has grown until today it is rated among the largest and best equipped porcelain enameling plants on the West Coast.

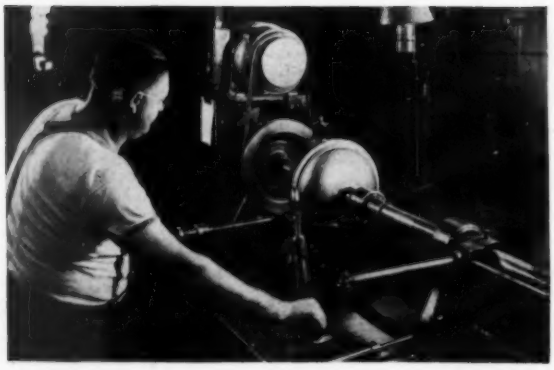
Plumbing fixtures and lighting reflectors

At the present time, the company is concentrating on three products—enameled plumbing fixtures, industrial and outdoor lighting reflectors, and reflector trough fixtures for fluorescent lighting. Other products in lesser quantities are produced, including shower bath receptors, refrigerator linings, and various types of enameled ware.

The first building we visited was the machine shop and sheet metal forming division. Presses, large and small, were drawing sheet iron blanks into reflector shapes. Other reflectors were being formed and trimmed on conventional metal spinning machines. Blanked, partly finished, and finished plumbing fixtures were finding their way along the production line.

More — turn page →

Photos showing lighting reflectors in production. Top: Enamel spraying and dryer conveyor. Bottom: Firing reflectors in the continuous furnace.



Reflector spinning.

Near the rear of the building, Hobbs pointed out a series of long shelves filled with thousands of jigs and dies of all sizes and descriptions. The company maintains a well-equipped machine department for manufacturing its own jigs and dies, and for miscellaneous maintenance and production work.

A completely conveyorized and continuous operation

The first thing that strikes the eye when entering the building devoted to porcelain enameling is the provision for mechanical handling of all work. Hundreds of feet of conveyor chain lace the ceiling, progressing at controllable speed past spray booths and dip tanks, and through the drying oven to feed the 7-burner "U" type continuous enameling furnace.

Ground coat on the reflectors is applied by dipping, while the two inner white and two outer green coats are hand-sprayed. Rotating jigs in the reflector spray booths minimize handling and assure even enamel application.

Hand spraying is used both for ground and top coats on most plumbing fixtures. The shower bath receptors are first given a ground coat, fired, then a second black coat topped with a splatter coat of green. The second black coat and splatter coat are fired simultaneously. This splatter coat not only improves appearance, but adds a degree of roughness to the finished product. The final coat on sinks is an acid resisting enamel.

A *clean* plant

Cleanliness marks the entire enameling department. The building is air-conditioned, and each spray booth is equipped with separate ventilating ducts. The conveyor chain that handles the wear through the drying oven is located conveniently behind the booth operators so that minimum lost motion occurs in transferring wear from booth to conveyor. When this conveyor emerges from the drying oven, it parallels the furnace chain for a considerable distance so that work is easily transferred.

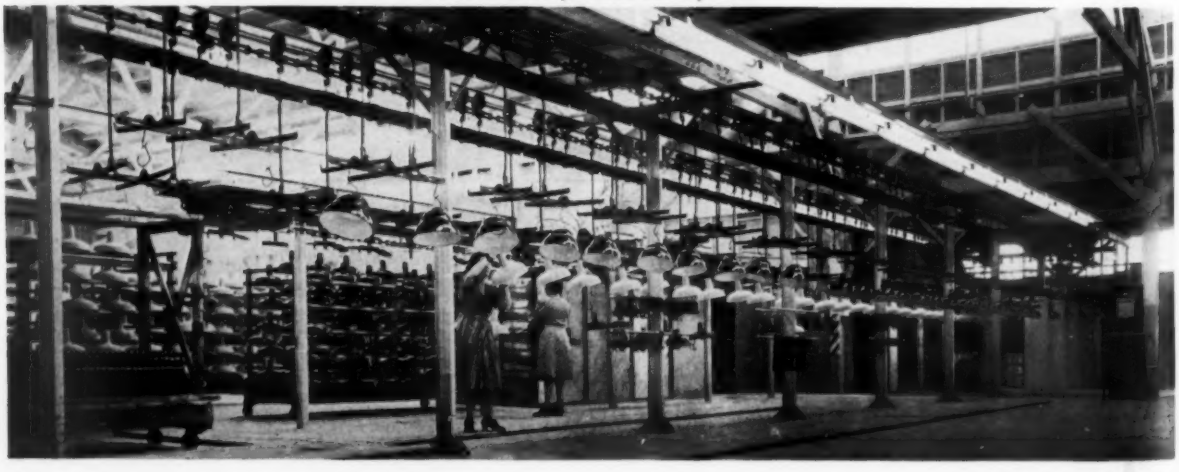
Five ball mills are provided for frit preparation. The metal cleaning and preparation installation consists of 6 deep tanks, with an overhead monorail conveyor. Solutions employed and tank arrangement are conventional.

Carry-over of an impressive war production record is still visible throughout the plant. Though the company at no time curtailed enameling activities, turning out large quantities of industrial and commercial lighting fixture equipment, they did branch into other types of production work, including flexible stainless steel machine gun ammunition chutes, and die-drawn aluminum protection helmets for industrial workers. Both the ammunition chute and helmet projects are still operating on a curtailed basis.

The company received considerable favorable publicity as a direct result of the ammunition chute project. They were one of the few companies in America to whom the WPB released sufficient and unending quantities of critical stainless steel. At one time, during the height of the conflict, a single purchase of stainless steel amounted to more than the entire net worth of the company.

Hobbs told us that George Holman was the first man in America to successfully enamel a lighting reflector. When pressed for details, Holman did not deny the statement, but stated modestly that "too many persons are claiming to be first in everything." President Smoot agreed with him.

The enamel furnace conveyor.



A. C. S. enamel division program

including abstracts by the authors

WITH the slogan "There's a room for you at Atlantic City," the ACS announced its 49th annual meeting to be held in Atlantic City, April 21-25. Headquarters hotel is the Traymore, but all meetings, both general and division, will be held at Convention Hall.

While the convention opens on April 21, Enamel Division sessions are scheduled to start Tuesday, April 22, and continue through Thursday, April 25. With twenty-four papers listed, a rigid time schedule has been established and it is apparent that the three days allotted will be jam-packed with information for the porcelain enameler.

The program as released by ACS follows:

Tuesday Afternoon, April 22

1. *Fundamental Aspects of Metal Cleaning*

   By J. C. Harris: Central Research Department, Monsanto Chemical Company, Dayton, Ohio

The fundamentals of metal cleaning are discussed according to the surfaces involved, soiling agents encountered, attracting forces involved and "neutralization" of such forces, materials used, and methods for soil removal.

The underlying causes of soiling and soil removal are discussed, methods for evaluation of and materials for soil removal are given, and recent developments in this field are outlined.

2. *Mechanism of Fracture in Porcelain Enamels*

   By Paul L. Smith: Crystal Section, Sound Division, Naval Research Laboratory, Washington 20, D. C. (formerly Research Associate of the Porcelain Enamel Institute at the National Bureau of Standards)

The work on enamel failure carried on by the Porcelain Enamel Institute Research Associate at the National Bureau of Standards is discussed. The various types of failure are described, with particular emphasis on impact failure. Certain features of impact fracture, not previously mentioned in the literature, are described, and the results of applying to porcelain-enameled metals the general theory of impact are discussed.

3. *Evaluating Adherence of Blue Sheet-Iron Ground Coat*

   By J. L. McLaughlin: Research Laboratories, Chicago Vitreous Enamel Product Company, Cicero 50, Ill.

Reflectance measurements are used to evaluate the adherence of blue ground coats on sheet-iron plates which have been tested by the drop-hammer impact machine. The values obtained show good correlation with visual estimations of adherence of enamel on steel with and without nickel flashing.

4. *New Method for Studying Fractures of Enameled Specimens*

   By F. A. Petersen and Rodney A. Jones: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

A method is described which locates cracks in enamel layers that are not visible to the eye or under the microscope at 500 magnifications. The method shows great promise in the study of thermal-shock failures in enameled utensils. An analysis of stresses present in the enamel layer of utensils during the heating up, subsequent rapid cooling, and reheating, is also included.

5. *Business Session*

Wednesday Forenoon, April 23

6. *Effect of Composition on Properties of Titanium Enamels*

   By Andrew I. Andrews, F. A. Petersen, and Arthur L. Friedberg: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

The development of a superopaque titanium enamel is described. Different components of the batch were varied systematically to produce an enamel which had excellent reflectance, thermal-shock resistance, and acid resistance. Variations in composition and reflectance curves are given for all of the enamels investigated. The stability of this type of enamel during firing and smelting was also studied. The results of this investigation indicate that titanium enamels of this type have very advantageous properties.

7. *X-Ray Study of Opacifying Crystals in Titanium Enamels*

   By Arthur L. Friedberg: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

The Hull-Debye-Scherrer powder method of X-ray diffraction for crystal analysis was used on slivers of the fired enamel. The results show that rutile or anatase are the crystals causing opacity in this type of enamel.

Although rutile was found in the majority of titanium enamels studied, there did not appear to be any cause for rutile crystals in some enamels and anatase crystals in others. The form of TiO_2 added in the raw batch did not affect the form of TiO_2 recrystallizing.

8. *Spectrophotometric Analysis of Titanium Enamels*

   By F. A. Petersen and Arthur L. Friedberg

In conjunction with the systematic investigation of titanium enamels, spectrophotometric curves were prepared for all of the enamels studied. The General Electric recording spectrophotometer was used to obtain these curves. This type of enamel has a characteristic low reflectance in the short-wave region of the visible spectrum, differing in this respect from superopaque antimony and zirconia enamels. Some differences in the spectrophotometric curves were noted over the field of enamels investigated; the only major change, however, occurred when even minute amounts of Cr_2O_3 were present. The addition of Fe_2O_3 or V_2O_5 to the titanium enamel did not cause any appreciable variations in the spectrophotometric curves even when as much as 0.5% of Fe_2O_3 and 0.2% of V_2O_5 were added.

9. *Effect of Variations in Color Stains on Colors Produced in Porcelain Enamels*

   By Ralph L. Cook and Robert W. Pelz: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

A representative series of colors, blue, brown, green, red, and yellow, was selected for the investigation. Variations of the constituents of these five stains were made, the resulting colors produced in the enamels were measured, and the spectrophotometric curves were compared. The influence of additions of BaO, PbO, and ZnO to the frit was also studied. Frit variations had little effect on the colors, but widely varying color characteristics, such as purity and brilliance, were obtained from the study of the various color stains produced.

10. *Comparison of Physical Properties of Superopaque Cover-Coat Enamels*

    By P. C. Stufft and G. H. Spencer-Strong: Pemco Corporation, 5601 Eastern Avenue, Baltimore 24, Md.

Antimony-, zirconium-, and titanium-opacified superopaque cover-coat enamels are compared as to surface hardness and resistance to impact, abrasion, and torsion. Comparisons are also made of the reflectance and color characteristics of the enamels. For the purpose of comparison, tests were run both at constant application weights and at the application weights normally used in the industry. The relation of resistance to torsion and abrasion, as well as the optical characteristics of the three types of enamel, were found to be most significant.

Wednesday Afternoon, April 23

11. *Suppression of Radiations at High Temperatures by Means of Ceramic Coatings*

    By Dwight G. Bennett: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

A method for measuring the emissivities of ceramic coatings and ceramic-coating materials with respect to oxidized stainless steel was developed. The emissivities in the visible red and the near-infrared spectral regions were studied over a temperature range of 800° to 1600°F. It was found

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Porcelain enam

EARLY in 1946 it was suggested by W. J. Plankenhorn, president of the Chicago District Enamelers Club 1946-47, and by others active in Enamelers Club activity that something be done to coordinate the efforts of the various clubs for their mutual benefit and to assist in the advancement of the porcelain enameling industry as a whole.

Finish presented this suggestion to the industry as a sound idea, and urged that it be followed through.

The first meeting was held at the Hotel Statler, Buffalo, on April 29, 1946. *(See June, 1946, finish.)* Those present at the meeting were: R. R. Danielson, of the Eastern Enamelers Club; E. E. Bryant, of the Central Club; F. A. Petersen and O. E. Mulvane, of the Chicago Club, with Dana Chase as acting chairman and W. J. Plankenhorn as acting secretary.

This was purely a preliminary meeting, but from it came a tentative outline of activity for the proposed coordinating committee. The plan as outlined was later approved by each of the individual clubs, and each club appointed official representatives to attend a dinner meeting scheduled at Urbana, Illinois, during the Porcelain Enamel Institute Forum last fall. In attendance at this meeting were: F. E. Hodek, Jr., S. E. Hemsteger, Ed. Mackasek, G. H. Spencer-Strong, John Steencken, C. S. Pearce, W. J. Plankenhorn, N. H. Stolte, Wendell Glick, R. R. Danielson, Dana Chase, G. W. Hofstetter, Glenn Grogan, and George Tuttle.

The Urbana meeting

This group discussed thoroughly each of the purposes or suggested activities that had been previously approved by the individual clubs. Following is a brief of the report of this meeting:

The motion was made and passed that W. J. Plankenhorn and Dana Chase be asked to serve as meeting chairman and corresponding secretary, respectively.

The first order of business was a review of the six purposes of the Coordinating Committee as outlined at the original meeting at the Statler Hotel, in Buffalo, on April 29. Each point was considered individually and a thorough discussion of each was encouraged. The point was stressed that there is no intent of forming "another national organization." The Coordinating Committee is for the purpose of strengthening the individual Enamelers Clubs through cooperative effort and assisting the responsible organizations already in existence.

1. Increase the effectiveness of the groups by coordinating the activity of the individual clubs into a more unified program.

a. It was suggested by the committee that each club put on its mailing list the chairman of the program committee and all officers of all active Enamelers Clubs. This would include notices of meetings, programs, and other information that might prove mutually helpful. Activities of the publicity committees and membership committees were discussed as being valuable to club activity.

b. It was suggested that an "explanation sheet" outlining the activity, purposes and plan of the Enamel Clubs be prepared for mailing to plant executives — this for the purpose of gaining executive interest in having plant men participate in club activity. An interchange between groups was suggested so that the resulting information would be reasonably uniform.

c. Attention was called to the advantages of advance publicity on meetings, and it was suggested that the various publicity chairmen check with all interested publications to determine closing dates and then advise program chairmen accordingly so that information would be in the hands of editors in time for advance printing.

2. Cooperate with the American Ceramic Society and the Porcelain Enamel Institute in obtaining a greater interest among plant men and club members in the program of these organizations.

a. Offer an opportunity for Pearce and Mackasek to speak at Club meetings in the interest of P.E.I. and A.S.C. activities.

b. Distribute any literature or bulletins of a technical or practical nature as provided by the PEI or ACS.

c. It was suggested that dates be watched carefully so there will be no conflict between club meetings and ACS division meetings.

d. Include announcements of ACS local section meetings in Club business, particularly when they pertain to enameling activity.

Note: Both Pearce and Mackasek issued invitations to the coordinating group to meet regularly at the time of the National ACS Convention and the PEI Forum. This would make two regular meetings a year for the Coordinating Committee. These would be worked into the respective programs by those in charge.

e. It was suggested by Dr. Spencer-Strong that attention be given to encouraging a Standards and Tests program.

3. Assist any group or groups interested in the possibility of organizing enamelers clubs in other districts.

a. It was agreed to send complete information similar to that furnished by the Chicago Club to the Eastern and West Coast Clubs as a guide for development of a club in the Detroit area.

b. It was decided to put out a feeler for interest in the St. Louis area.

c. The desirability of having all Clubs affiliate themselves with strong technical groups in their respective localities was indicated. (An example of such an affiliation is the Chicago Technical Societies Council in which the Chicago club holds membership.)

4. Develop a program to assist in the dissemination of available constructive information of interest to enamel plant men.

5. Extend the industry's cooperative activity throughout the entire year in addition to the usual scheduled meetings of the existing organizations.

Points 4 and 5 were covered in the discussion of previous points.

6. Provide for a continuous flow of information between the participating Enamelers Clubs.

a. It was suggested that point No. 6 should be the responsibility of the Club secretaries.

b. The PEI and ACS are interested in getting copies of all information released by the Clubs.

At the close of the meeting, the point was again made that should the Clubs approve the continuation of the Coordinating Committee activity, such activity would be confined to semi-annual meetings, and that the activity would be strictly of a "suggestion" or advisory nature, with representatives reporting back to individual clubs for a decision on any action to be taken. If the report of the October meeting was acted on favorably by the individual clubs, it was considered necessary that the secretary of each club so advise the other cooperating clubs following the next business meeting so that missionary work could be put in motion to carry out the suggestions outlined.

This report was presented to the individual clubs having representa-

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...elers clubs

approve nationwide coordinating committee

● **Eastern Enamelers Club**
President: Nathan Klein
Vice President: Fred Campbell
Secretary-Treasurer: Howard Williams
Program Chairman: Herbert Turk

● **Central District Enamelers Club**
President: Dan Meeker
Vice President: Dan Gredys
Vice President: Ralph Andrews
Secretary-Treasurer: Franklin Bond
Program Chairman: Dan Gredys

● **Chicago District Enamelers Club***
President: W. J. Plankenhorn
Vice President: Paul Gerdes
Secretary-Treasurer: George Tuttle
Program Chairman: O. E. Mulvane

● **Pacific Coast Enamelers Club**
President: Glen Fulton
Vice President: Walter Bauer
Secretary-Treasurer: Howard Burlingame
Program Chairman: E. P. Kysar

→ *from preceding page*

tives at the meeting, and in each instance it has been approved by the club memberships.

The next proposed meeting at the time of the ACS Convention at Atlantic City will afford an opportunity for the club representatives to report on the extent to which it has been possible for each club to participate as suggested. *Finish* strongly urges that insofar as this coordinating activity may prove beneficial to all existing enamelers clubs and to national organizations, such as the A.C.S. and P.E.I., that it be given wholehearted support by every one in the industry.

Coordinating committee—luncheon meeting
Hotel Traymore
Atlantic City—Wednesday, April 23.

** Officers listed were in office during the development of the Coordinating Committee. The Chicago club now has new officers.* (See March, 1947, *finish*.)

★ **American Ceramic Society**
President: J. E. Hansen
Vice President; John D. Sullivan
Treasurer: W. E. Cramer
Trustee, Enamel Division: Frank R. Porter
General Secretary: Charles S. Pearce

★ **Porcelain Enamel Institute**
President: R. H. Turk
Vice President: Herbert R. Spencer
Vice President: W. A. Barrows
Vice President: J. H. E. McMillan
Vice President: R. A. Dadisman
Treasurer: William A. Hogenson
Secretary: Edward Mackasek

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that the numerous materials investigated covered an emissivity range of from more than 100% to less than 10%. Lepidolite was the highest emitter; Uverite was the lowest. Transmission of radiant energy decreased with coat thickness according to established laws. The transmission of radiant energy through coat-bonding glasses could be greatly influenced by composition. Every material has a characteristic tendency to emit radiations at a given temperature. High-temperature ceramic paints were found to be effective radiation suppressors and thermal insulators.

12. *Gloss Measurements of Porcelain Enamel with the Reflex Glossmeter*

By Richard S. Hunter: Henry A. Gardner Laboratory, Incorporated, Bethesda 14, Md.

To measure specular gloss, it is the standard practice to illuminate a test surface with a narrow beam of light, and then find by measurement the fraction of this beam that is reflected in the direction of mirror reflection. This can be readily done where the test surface is flat, but a curved or wavy surface reflects specular rays in a scattered range of directions. Some of these rays may be diverted to one side of the receptor opening of the usual glossmeter. Because porcelain enameled surfaces are seldom flat, it is frequently difficult to measure them for specular gloss. With the new reflex glossmeter, however, the diverting effect of surface curvature has been eliminated as a source of error.

In this instrument, a high-grade retroreflector of the type widely used for night-visible traffic and vehicle markers is placed in the path of all rays specularly reflected by any surface. The minute lenses of this retroreflector return each ray, striking them to that area of the test surface which first reflected it. Specular reflection occurs a second time with each ray taking the path of its first reflection in reverse direction. Thus deviations of rays due to sample curvature are compensated, and the twice-reflected rays return toward the small source. A thin beam-splitting pellicle is interposed between the collimating lens and source to divert a part of this reversed beam to one side where it is received for measurement by a photocell. Examples of the application of this new instrument to porcelain enamels are described.

13. *Effect of Various Clays on Permeability of Ground-Coat Enamel Slips and Oxidation Behavior of Metal*

By Ralph L. Cook and Byron B. Schiller: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

The permeability of several clay slips to the passage of water was compared with that of the same clays when used in ground-coat enamels. The progressive weight changes taking place in the firing of ground-coat enamel on metal was followed analytically. The total water loss from the clay apparently would influence the amount of oxide formed. The tests also indicate a possible correlation between the permeability of the enamel slip and the total weight of oxide formed in firing.

14. *Effect of Chemical Preoxidation of Steel in Promoting Adherence of Cover-Coat Enamels*

By Hollis S. Saunders: The O. Hommel Company, Pittsburgh 30, Pa.

The adherence of cover-coat enamels when applied directly to the steel surface is markedly improved by pre-oxidizing the surface. Commercial cover-coat enamels, using antimony-, zirconium-, and titanium-opacified frits, were applied to various chemically oxidized steel surfaces, and the adhering properties of these enamels to the various types of oxide coatings are given.

15. *Preliminary Study of Enamels for Aluminum*

By Reta Farnham and R. B. Burdick: Department of Ceramic Engineering, New York State College of Ceramics, Alfred, N. Y.

Softening points of a number of enamels were determined. They were fired on aluminum at temperatures up to 600°C. to determine the manner in which they developed a glossy coat and adhered to the aluminum. The most promising enamel which fired at 575°C. was further studied with a view toward improving finish and adherence.

Thursday Forenoon, April 24

16. *Superopaque Frits of Low SiO Content*

By W. J. Baldwin: Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.

A series of frits is described which differ radically from the present antimony-, or zirconium-opacified types of superopaque frits. Reflectance readings of 80 to 85 are obtainable with application of 40 gm. per sq. ft. Application weights of 20 to 35 gm. per sq. ft. give reflectance values equal to or superior to present-day enamels. The application of this type of enamel as a one-fire finish directly on steel shows definite possibilities with a maximum enamel-coating thickness of 0.008 in.

17. *Some Improvements of Button Test for Determination of Frit Fluidity*

By Edward E. Marbaker: O. Hommel Research Fellow, Mellon Institute, Pittsburgh 13, Pa.

An investigation was conducted on the so-called button test for frit fluidity (C. J. Kinzie, *Jour. Amer. Ceram. Soc., 15* [6] 357–60 (1932)) in a small Hoskins electric furnace in order to attain a high degree of reproducibility. Among the important factors are (1) particle size and shape of the frit, (2) kind and amount of binder, (3) maintenance of constant dimensions and weight of the pellet, (4) position of the test plate in the furnace, and (5) time of heating in the horizontal position. An improved procedure for making the test is suggested.

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"Sure I'll share my room with an A. C. S. man but this guy brought his wife, two kids and a goat!"

Central district enamelers club

sets new attendance record

AN excellent program and a continued increase in attendance combined to make the March 7th meeting of the Central District Enamelers Club one of the most effective in the Club's history. One hundred and thirty-six were present at the Friday evening meeting held at the Lake Shore Country Club, Cleveland, Ohio. This topped attendance of one hundred and twenty-one at the preceding meeting.

At the speakers' table were: F. H. (Deke) Bond, secretary and treasurer; J. B. Simons, speaker; Dan Meeker, president; G. H. Spencer-Strong, speaker; and Dan Gredys, vice president.

Immediately following the dinner and a short business meeting the three-subject program got under way.

Propane as a stand-by fuel

The first speaker was J. B. Simons, superintendent of the enameling plant, Westinghouse Electric Corporation, Mansfield. He described the propane installation at their Mansfield plant which enabled the company to continue production during a recent period when the plant would otherwise have been closed down due to a shortage of gas in the area. Simons made it clear that he was not discussing the question of the fuel being better or cheaper. His discussion related to propane's present use at their plant — that of a "stand-by" installation.

The company had its warning in 1945, when the gas shortage appeared. During 1946, there was again an acute shortage. The local gas company was apparently open minded in presenting the problems, so that Westinghouse deemed it advisable to provide facilities in the event of repeated shortage.

Total gas usage was 33,000,000 cubic feet per month, so it was decided to install a propane unit of sufficient capacity to handle this total requirement.

Enamelers were interested in the statement that no changes were required in burner equipment, and that the gas could be introduced into the system in varying proportions to meet current requirements. The liquid propane is supplied to the plant in tank cars or tank trucks and stored in a 30,000 gallon tank. The liquid is delivered under pressure, and from 10 to 15 lb. additional pressure is applied to pump it into the stationary storage tank, which is constructed of 7/8" welded steel plate. Mr. Simons pointed to the desirability of a double tank installation for flexibility.

The first step in preparation of the fuel is the change-over from a liquid to vapor, through the use of a heat exchanger. The vapor then passes through the necessary distributors, check valves, mixers and controls, to provide shop feed lines with gas of proper pressure and BTU content. This stand-by fuel is adjusted to approximately the same BTU content as the fuel normally used. Since the installation was made, Westinghouse has used about 110,000 gallons of propane, which has substituted for about 15,000,000 cubic feet of gas. It is estimated the cost is approximately 75¢ per 1,000 cubic feet.

Mr. Simons again emphasized the fact that when normal sources for gas are cut off, the figuring of comparative cost down to the penny means very little in comparison with time, money, equipment and organization morale saved through uninterrupted operation. He estimated that the Mansfield operation saved $25,000 per day through continued operations when the plant would otherwise have been closed.

Titanium enamels

Dr. Spencer-Strong had the attentive ears of the group for his discussion covering the comparatively new type of high opacity cover coats, titanium enamels.

Said Dr. Strong, "Although almost revolutionary to the average enameler, titanium enamels are, in fact, the culmination of years of effort on the part of the technical branch of the industry." He traced the work of leading research men in both Europe and this country, and followed through with a direct comparison between enamels of the antimony, zirconium, and titanium types. The comparison was made for nine properties: reflectance, color, solubility, acid resistance, torsion resistance, impact, surface hardness, thermal shock, and workability.

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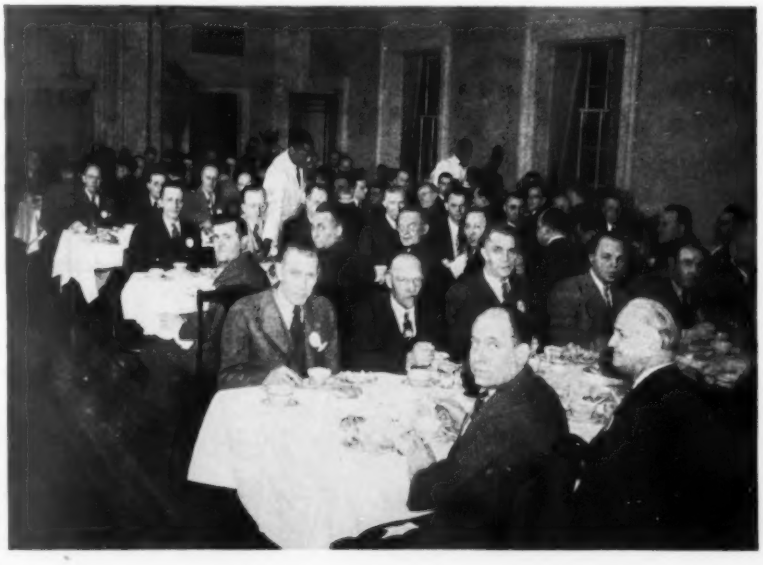
Porcelain Enamelers enjoy dinner at the Lake Shore Country Club



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INGRAM-RICHARDSON MFG. CO., OF INDIANA, INC.

OFFICES, LABORATORY AND PLANT, FRANKFORT, INDIANA

The Washington round-up

By Wilfrid Redmond

The House Ways and Means Committee has reported favorably on a bill (H. R. 2404) to suspend the 4 cents a pound import tax on copper materials which, according to Representative James Patterson, of Connecticut, who introduced it, is designed to relieve a serious shortage of copper now curtailing the production of refrigerators and washing machines. The tax would be suspended until March 31, 1950. The time limitation is taken from another bill introduced by Representative Grant of Indiana. The bill has the support of the automobile and durable goods industries. It is opposed by senators and representatives from the western mining states who see in it a threat to small domestic producers of copper.

Supporters of the measure point out that domestic production of copper in 1947 is estimated at 950,000 tons maximum, while requirements are expected to total 1,400,000 tons. To meet consumer needs, imports must, therefore, reach 450,000 tons. Receipts of copper materials from foreign sources in this country are currently negligible.

Representative Patterson told the House that lack of copper will create a bottleneck in the production of electric refrigerators, of plumbing supplies, and thousands of other items. Copper is needed in greater quantity to preserve the business of 160,000 electrical appliance dealers, he said. He estimated that returning GI's who have entered the electrical appliance business are now failing at the rate of 5 per cent per month for lack of materials to sell which employ copper.

This bill will meet strong opposition in the Senate, and will be killed unless a compromise is reached with Senators from western mining states, reducing the term of the suspension from 3 years to 1 year.

Scarce materials controls?

With the termination of the CPA allocation powers March 31, Congress has to decide what to do about continuation of controls over scarce materials. The Senate Judiciary committee has appointed a sub-committee to consider extension of the Second War Powers Act with respect to tin and antimony.

Without controlled distribution of tin, the supply will be used up in six months, John Houston, Jr., commissioner of CPA, told the sub-committee. Consumers of antimony materials will be seriously affected by shortened supplies before the end of 1947 without controlled distribution, he predicted.

Another material, lead, will fall short of requirements in 1947. It is estimated by CPA that total lead supplies in 1947 will probably range between 890,000 and 930,000 tons, including imports, with unrestricted requirements of approximately 1.2 million tons. Requirements for soft lead are currently the most difficult to meet, although the shortage is being relieved to some degree by softening additional antimonial lead.

Subsidies on lead production continue until June 30, 1947. The President has not asked for extension of the plan for premium payments on lead production.

Soda ash deficit 500,000 tons

A shift in the controlled distribution of soda ash may be expected March 31, when CPA passes from the scene. The soda ash industry is currently operating on a voluntary plan of allocation, but may be expected after March to favor consumers in historical marketing areas. Soda ash is expected to be a distribution problem during the remainder of 1947. It is estimated that the soda ash deficit in 1946 amounted to approximately a half million tons, and no improvement is anticipated in 1947.

Bathtub production in 1947 is expected by CPA to be 10 to 15 per cent short of requirements estimated at 1.7 million units. In the case of sinks and combinations, it is expected that the production will exceed the estimated requirements of 2.3 million units and that distributors will have an opportunity to build up inventories.

CPA, in a production report at the end of February, forecast that production of consumer durable goods in 1947 will greatly surpass the 1940-41 base period, which was the highest in the history of the industries concerned. Despite the anticipated increase, the supply is expected to fall short of meeting requirements.

Construction prospects

Recent studies of industrial construction prospects in 1947 point to an increase in authorization over the next few months over the $50 million a week now being approved. However, materials shortages will continue to hold up non-residential building. There will not be enough cast iron soil pipe, for instance, to service commercial and industrial building on an unrestricted basis. The production requirement for 1947 is about 600,000 tons. To achieve this level of production, larger supplies of both pig iron and scrap iron are necessary.

All the items on the certification list for pig iron, except cast iron soil pipe, were recently removed. A plan is being worked out with industry at the present time to distribute pig iron on a voluntary basis for the critical items in the housing program.

Senator Glenn H. Taylor, of Idaho, recently told the Senate, in a debate on deficiency appropriations, that on April 30 there will no longer be any machinery to enforce building materials priorities allocations.

"Operators then will be able to start building anything they please," Senator Taylor said. "That will mean the end of the veterans' housing program and the end of construction of medium-cost housing, for at that time the actual situation will be that nothing but mansions will be able to be built, and they are all the houses that will be built until such time as the market for mansions is saturated."

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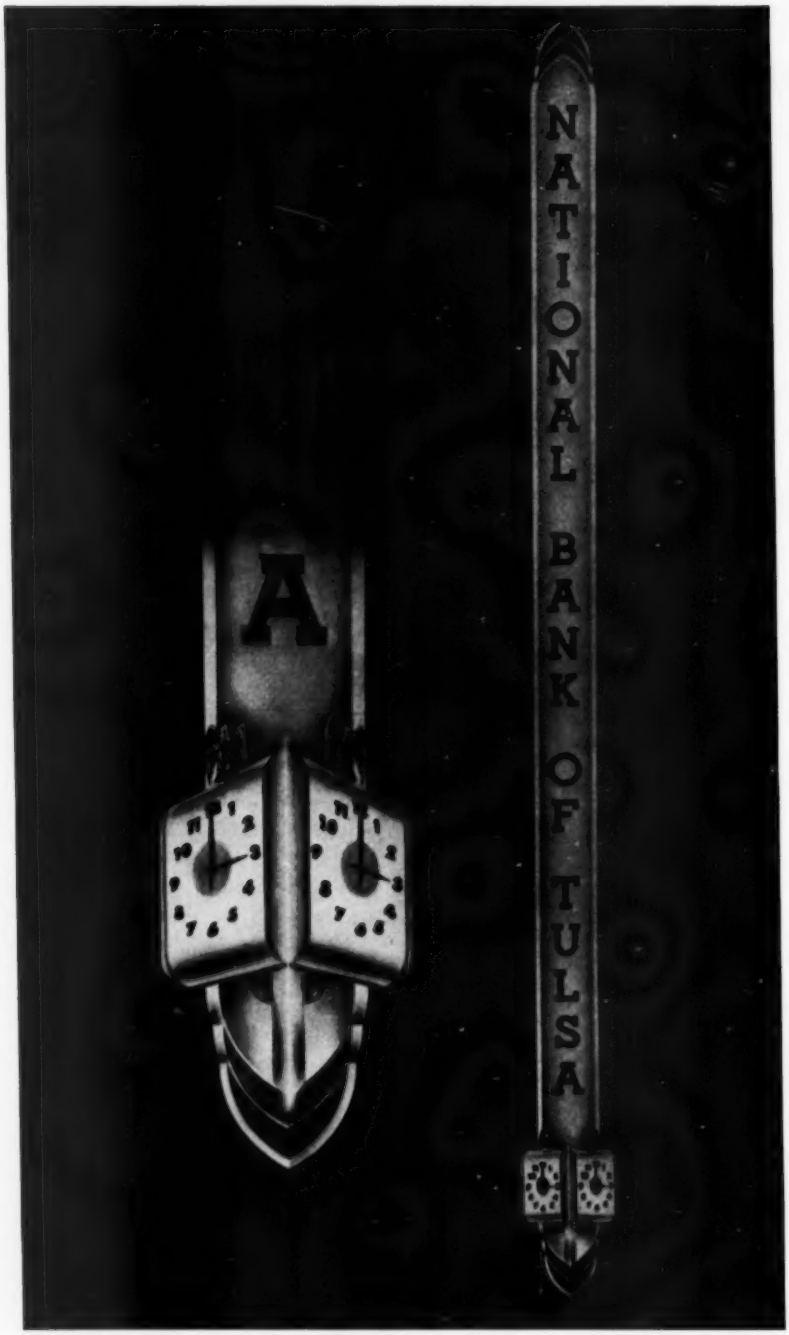
Porcelain enameled sign 120 feet in height



This 120 ft. porcelain enameled sign will be hung in late spring or early summer by the National Bank of Tulsa, Oklahoma, on the 24-story building it occupies.

The vertical sign section will have 3 ft. porcelain enameled letters attached to both sides of the 120 ft. stem. At the lower end of the stem a four-dial, illuminated clock will be installed. The clock will have 6 ft. dial faces and numerals of plastic, set into a porcelain enameled clock case. Both the clock and the sign letters will be lighted with concealed neon tubing.

Chapman Company, Tulsa, designed the sign, and construction will be handled by Wallie Werr Company, of the same city.

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Sheet steel will remain short

Turning back to materials, present indications point to a total finished steel product supply in 1947 of approximately 51 million tons, or 18 per cent higher than in 1946. Demand for sheet and strip is expected to exceed available supply in 1947 by a wider margin than in the case of most other steel products. This results from a concentrated demand for sheet and strip products by manufacturers of such shortage items as automobiles, refrigerators and other appliances, and plumbing and heating supplies. The sheet and strip situation may be eased to some extent late in 1947 by the completion of expansion projects.

CPA forecasts:

(1) Some increase in wage rates in the spring of 1947.

(2) Price declines in agricultural products.

(3) An increase in building activity and in the output of durable consumer goods for at least a good part of the year.

(4) A continuation of the present high level of expenditures for plants and equipment at least for the next six months.

CPA business analysts, for the first time, suggest the possibility of a decline of production, employment and prices in the second half of 1947, extending into 1948. This prediction corresponds closely to the pattern of previous business cycles, it is pointed out. The recession *(a possibility)* will be preceded in the first half of the year with a sharper increase in prices and a very small expansion in production. The other possibility will be continuation of employment and production at, or slightly above, the present level; a moderate rise in prices in the first half of the year; a slow decline in the second half. These two possibilities are designated as "Alternative A" and "Alternative B" in the CPA forecast.

Representative James C. Davis of Georgia has introduced a bill (H. R. 2443) to terminate Regulation W, the

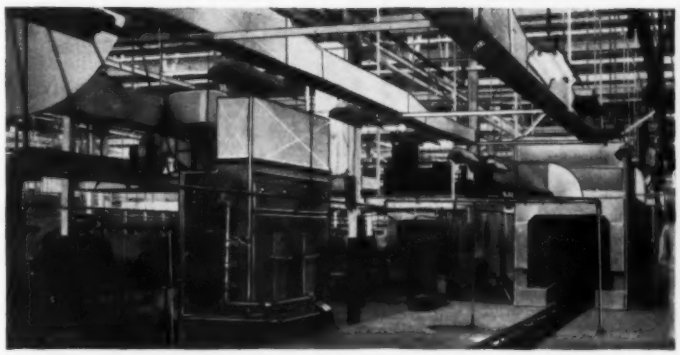
to Page 62 (Column 2) →

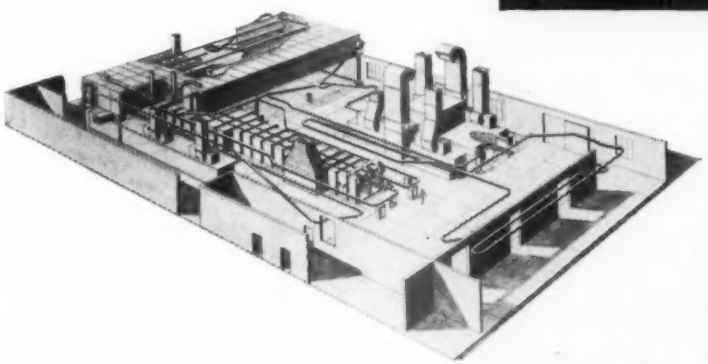
Koch will design, fabricate and install your

Complete, High Production

PORCELAIN ENAMEL FINISHING SYSTEM

Below: A complete Porcelain Enamel Finishing System designed, built and installed (with the exception of the high temperature furnace) by KOCH for a prominent West Coast manufacturer. The ground coat and final coat driers are elevated overhead to save valuable floor space, and many other innovations were introduced to increase production and improve quality.





Above: A general view of part of the completely conveyorized, mammoth synthetic finishing system engineered and installed by KOCH for a midwest automotive plant, an example of the scope of KOCH facilities.

KOCH will design, fabricate and install the complete system. There is only ONE responsibility. Your inquiry is invited.

GEORGE KOCH SONS, INC.

KOCH

INDUSTRIAL EQUIPMENT

EVANSVILLE, INDIANA, U. S. A.

NEW YORK
William Printz Co.
358 Fifth Ave.

CHICAGO
George Koch Sons, Inc.
53 W. Jackson Blvd.

LOS ANGELES
Industrial Systems Co.
341 S. Central Ave.

Branch offices in most industrial centers.

Here's a Name You Can Depend Upon

VITRO
ENAMELERS OXIDES

VITRO
DECAL COLORS

VITRO
SCREENING COLORS

VITRO
DRY PROCESS COLORS

VITRO
GRAINING COLORS

VITRO
CERAMIC CHEMICALS

●

When you buy ceramic colors, chemicals or supplies, you are buying more than materials—you are buying satisfactory plant production results and salable finished products.

The name VITRO assures all this and more. It stands for Quality, Experience and Service—based on over forty years of service as color specialists to the ceramic industry. VITRO is a name you can depend upon.

● *QUALITY*
● *EXPERIENCE*
● *SERVICE*

VITRO
RESISTOR ENAMELS

VITRO
PORCELAIN MILLS

VITRO
TITANE

VITRO
ZIRCON

VITRO
OPACIFIERS

VITRO
MILL LININGS

VITRO
GRINDING BALLS

THE VITRO MFG. CO. PITTSBURG, PA. TRADE MARK

THE VITRO MFG. CO.
Corliss Station, PITTSBURGH, PA.
Branch Plant
Canonsburg, Pa.
California Office:
16 California St., San Francisco, Calif.

NEWS

Ed Adams with Lansdale Porcelain

It is reported that Edward Adams is now with Lansdale Porcelain Enamel Company, Lansdale, Pa., in the capacity of enamel plant supervisor. Ed was formerly with Roberts and Mander Corporation, Hatboro, Pa., and later with Erie Enameling and Ervite Corporation, both of Erie, Pa.

Weaver handles Stassen interests in Ohio

The Cleveland Press reports that R. A. (Bob) Weaver, president of Ferro Enamel Corporation, is looking after the Ohio affairs of Harold Stassen, candidate for the Republican nomination for president.

It will be remembered that Bob was one of the staunch supporters of Wendell Willkie in the 1940 presidential campaign. At that time he was chairman of the local finance committee that raised $400,000 for the Willkie campaign.

New plant superintendent at American Stove, Lorain

Carl A. Eversman has been promoted to plant superintendent of the Lorain, Ohio, division which makes oil stoves and heaters for American Stove Company, according to a recent announcement by Thomas M. Sourbeck, division manager.

Eversman has served as industrial relations manager of the plant since 1945 and will retain this position along with his new responsibilities. During the early war years, he had been in charge of training war workers for all Lorain industries.

New purchasing agent at Florence Kankakee plant

C. J. Romary has been appointed purchasing agent for the Kankakee plant of the Florence Stove Company succeeding A. R. Riley who resigned January 1, according to a company report.

Romary has been associated with the Kankakee plant since 1940 as foreman of the paint department and, since last spring, has been assistant purchasing agent. Prior to joining the Florence organization, he was assistant manager of the Mortell Paint Company plant.

Vitro president dies

Eugene M. Fleck, president of The Vitro Manufacturing Company, died suddenly of a heart attack on February 24. He was 53 years of age.

Intimately associated with the development and production of ceramic colors for many years, Mr. Fleck served as a research chemist, and since 1937, as Vitro's president and general manager.

The deceased attended Carnegie Institute of Technology, and was, for many years, associated with the Standard Chemical Company of Cannonsburg, Pa., one of the first producers of domestic radium, vanadium and uranium. He is said to have been one of the country's leading experts on uranium. He was a member of the American Ceramic Society and the American Chemical Society.

Gates to Columbian Enameling and Stamping

R. Wayne Gates is now a ceramic engineer at Columbian Enameling and Stamping Co., Terre Haute, Indiana. Following his discharge from the Army, and prior to joining the Columbian organization, he was on the research staff at Pemco. He received his M.S. degree in ceramics in 1940 from the University of Illinois.

Washer-ironer sales continue upward

Factory sales of household washers in January were second highest of any month in the industry's history, totalling 240,233 compared to 247,816 in October, 1946. Sales were 26 per cent above the preceding month's, 190,770, and topped those of the comparison month in 1946, according to announcement made by the American Washer and Ironer Manufacturers' Association.

Ironer sales in January were 15,509 as against 15,469 in the preceding month, and 3,235 in January, 1946.

Cribben and Sexton elects new officers

At a recent meeting of the board of directors of Cribben & Sexton Company, manufacturers of Universal Gas Ranges, William M. Hillborn

was elected president succeeding George D. Wilkinson, Sr., who retains the position of Chairman of the Board. Thomas H. Heneage was elected vice chairman of the board, and Sidney R. Hill was named controller. George D. Wilkinson, Jr., secretary of the company, was also made a member of the board of directors. Wendell C. Davis was re-elected vice president and treasurer.

New C. & S. purchasing agent

W. C. Wilkinson has been appointed purchasing agent of Cribben and Sexton Co. He succeeds Carl E. Lyon who retired the first of the year.

After graduation from Williams College in 1938, Wilkinson joined Cribben's office staff. He was promoted to assistant to the president just prior to joining the armed forces in 1941. He resumed association with the company, in the purchasing department, in January, 1946.

New Despatch Oven representatives

National sales facilities of Despatch Oven Company, Minneapolis, have been expanded by the appointment of six new territorial representatives, according to H. L. Grapp, president.

John Wright, of Air Comfort Associates, Inc., 412-414 Stanley Avenue, Evansville, Ind., and George W. McDaniel, 325 Bankers Trust Building, Indianapolis, will handle sales in their respective areas. Fredric and Baker, 826 Ardis Building, Shreveport, La., will have the Louisiana-Arkansas region; William T. Day, of the Day Engineering Company, 300 Essex Avenue, Narberth, Pa., the Pennsylvania-Delaware region; and DeWitt Gunsolus, 267 East Paces Ferry Road N. E., Atlanta, territory including Georgia, South Carolina and Florida. Northern California has been assigned to W. C. Matheson, 151 San Bruno Avenue, San Francisco.

Organization changes at Roberts & Mander

It is reported that following a recent stockholders meeting of Roberts and Mander Corporation, Hatboro, Pennsylvania, John H. Emery, formerly district manager for the New York State area, becomes vice president and sales manager, replacing R. S. Agee, who resigned as vice president and director to establish a wholesale marketing business.

In addition, it is learned that two new members were elected to the board: P. M. Sturges, partner in the firm of Graham Parsons, and J. A. Cairns, of the Cairns advertising agency, New York. Directors re-elected include: H. S. Minster, president; Wm. Jaeger, treasurer; W. B. Lex; John Klumpp; and Robert Rowe.

Honeywell elects new vice president

L. M. Morley, vice president and general sales manager of the Brown Instrument Company, industrial division of the Minneapolis-Honeywell Regulator Company, has been elected a vice president of the parent organization. According to the announcement, he will continue in his same capacity with Brown, with headquarters in Philadelphia.

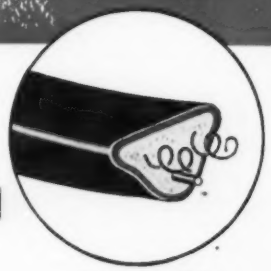
Design your our kitchen with component models

Hotpoint, Inc., has been making full use of small component models for the design of model kitchens. Here we see Ruth Ellen Merlyn, College Inn model, designing her own kitchen at the Hotpoint exhibit, National

Sensational New Leader of a Distinguished Line!

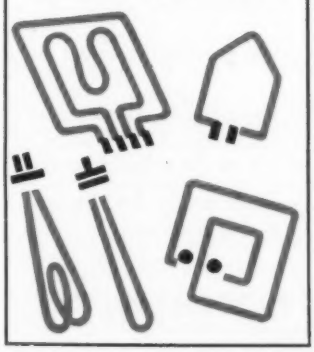
The Incomparable New

THERMO-KLEEN *Monotube*



Monotube Coil—
A T-K Exclusive!

T-K Units for Many Regular or Special Needs



● The new Thermo-Kleen Monotube range unit is being hailed as the greatest improvement in electric cookery since the creation of the electric range itself. New in principle—new in design and construction—it sets new standards of cooking efficiency.

Its single, free-acting, anchorless coil is not welded . . . stays flat after long, hard use . . . is cleaned in a jiffy. The greater utensil-contact area in proportion to mass permits faster cooking.

This new unit is but one of a great line of T-K molded electric heating units for domestic appliances, industrial and commercial applications. Manufacturers of products or appliances involving electric heat are urged to consult us.

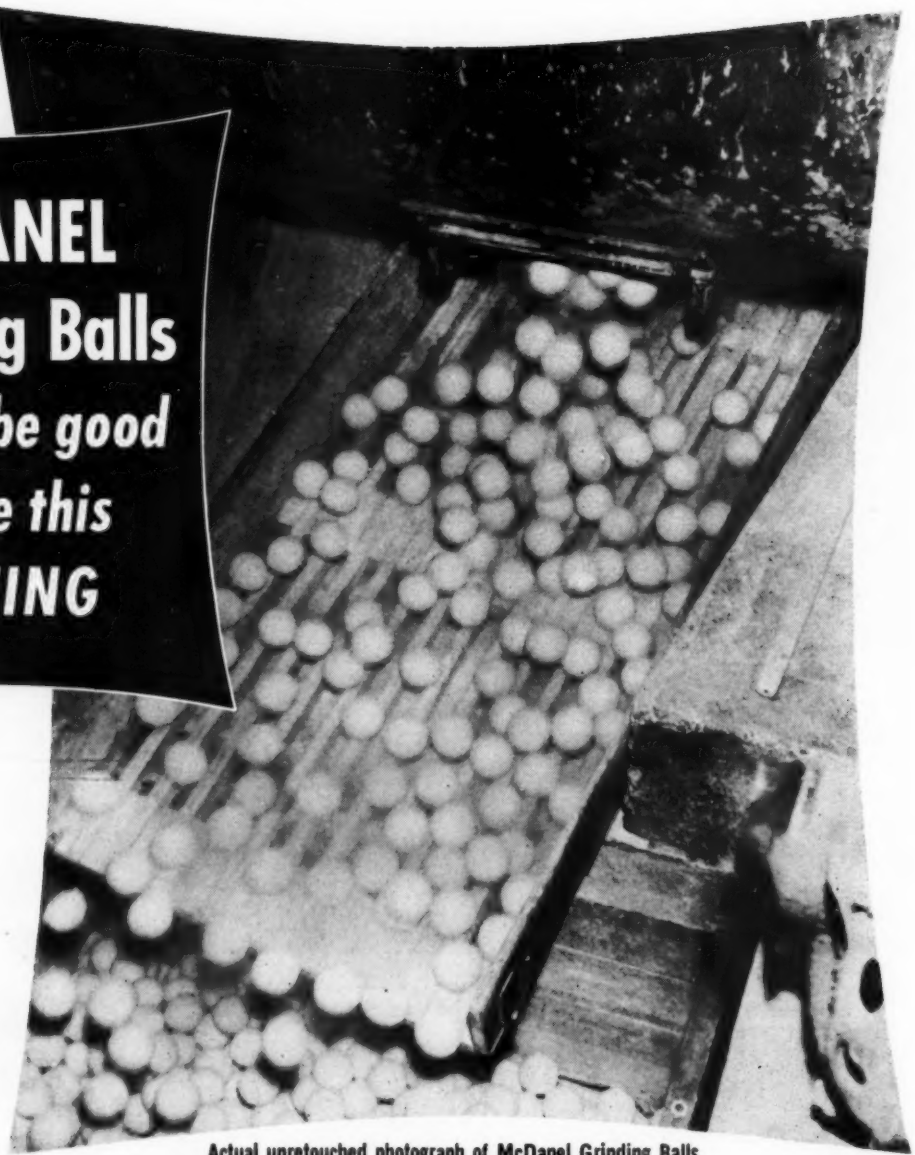
Manufacturers: Domestic and Industrial Heating Units—Switches—Controls

Tuttle & Kift INC.
THERMO-KLEEN

1823 N. Monitor Avenue, Chicago 39. Cable Address: TUTTLEKIFT

World-Wide Distribution: BRITISH ISLES—Ferro Enamels, Ltd., Ounsdale Road, Wombourne, Wolverhampton, England . . . **SCANDINAVIA AND EUROPE (Except France)**—Ferro Enameling Corp. of Holland, V. Helmonstratt Voltastraat, Rotterdam (West), Holland . . . **AUSTRALASIA**—Ferro Enamels (Australia Pty., Ltd.), Bourke Road, Alexandrie N. S. W., Australia . . . **FRANCE AND POSSESSIONS**—Societe Anonyme Pour L'exploitation des Procedes Ferro, 3 Rue Saint Georges, Paris 9 e, France . . . **SOUTH AFRICA**—Ferro Enamels (Pty.), Ltd., Johannesburg, South Africa . . . **BRAZIL**—Ferro Enamel S. A., Caixe Postal 2948, Sao Paulo, Brazil . . . **ARGENTINA, URUGUAY, CHILE AND PERU**—Ferro Enamel S. A., Gibralter 1365, Avellaneda F. C. S., Argentina . . . **MEXICO**—Ferro Enamel de Mexico S. A., Edificio C. I. B. A., Guerrero No. 2, Desp. 309-310, Mexico, D. F. . . . **CANADA**—Ferro Enamels Canada Ltd., 629 Wellington Street, Ottowa, Ontario, Canada . . . **ALL OTHER COUNTRIES**—Ferro Enamel Corporation, International Division, Cleveland, Ohio.

McDANEL Grinding Balls *Have to be good to take this BEATING*



Actual unretouched photograph of McDanel Grinding Balls being discharged from a test mill.

During the manufacture of McDanel Grinding Balls every effort is made to guard against imperfections. Notwithstanding these efforts, every Ball is mill-tested to prove its ability to stand up and take it.

The illustration shows the balls being discharged from the mill where they have been run for a specified time with no charge to cushion the abrasion. This is far more of a beating than they will get when in actual use in your plant.

They are then individually inspected to eliminate all that show weaknesses. Those that come up to McDanel's high standard are passed along to the shipping room.

You may have complete confidence in the strength, durability and performance of any McDanel Grinding Balls which you receive.

Porcelain Grinding Jars and Mills • Mill Head Assemblies • Mill Lining Brick • Special Mill Lining Shapes
Door Lining Blocks • Metal Covered Grinding Jars and Jar Mills

McDANEL REFRACTORY PORCELAIN CO.

BEAVER FALLS, PENNSYLVANIA

CHICAGO VITREOUS ENAMEL PRODUCT CO., EXCLUSIVE REPRESENTATIVE FOR THE ENAMELING INDUSTRY

Builders exposition, Chicago. Miss Merlyn is the daughter of John S. Merlyn, well known Chicago builder.

New national service manager for Norge

L. B. Cash has been elevated to the position of national service manager for Norge Division, Borg-Warner Corp. His new position was formerly held by Thurlo F. Johnson, who has been appointed sales manager of the central region.

Cash has had long experience in the national service department and knows the factory, distributor and dealer problems. As one Norge executive commented: "He has the advantage of knowing it is one thing to *sell* a product and quite another to *keep it sold.*"

Hotpoint adds to marketing organization

Leonard C. Truesdell is to become vice-president in charge of marketing, Hotpoint Inc., Chicago, James J. Nance, executive vice-president, announced. Truesdell was formerly with Bendix Aviation Corporation and, before that, with Frigidaire.

This newly created position carries with it responsibility for all commercial phases of the company's operations, including that of general sales management.

Previously, Hotpoint announced plans for capital and plant expansion involving $17,000,000 that would treble electric range production and cause parallel increases in output of other electric kitchen and home laundry major appliances.

The porcelain enameled gas range can "take it"

Buried and hidden from the Japs for four years . . . uncovered and carried on a native's back across 75 miles of mountain and jungle . . . now performing perfectly in a small hut in Consolacion Berrio at Agao, La Union of the Philippines. That's the wartime epic of a Magic Chef gas range as told by George Stebbins, of the North Central Gas Company, Scotts Bluff, Nebraska.

Mr. Stebbins had sold Magic Chefs for North Central Gas Company before entering the service. His tour of duty took him into the Philippines, where, in passing a small hut in Agao, La Union, he spotted a shiny white Magic Chef.

When questioned by *finish* concerning the condition of the porcelain enamel, an American Stove executive said: "You are correct in feeling sure that the stove was porcelain enameled and that the porcelain enamel remained in good condition. In his statement, Mr. Stebbins said that the Chef looked as good as new and that it operated with all of its old-time efficiency. We are sending along a photo of the particular model which was described in the story."

Same model range found by Stebbins.

Frigidaire training school includes porcelain enameling plant

Three members of the first training program class inspect the porcelain enameling section as tops for Frigidaire electric ranges are being porcelain enameled. Left to right are: W. H. Judd, Oakland, California; S. L. Curry, Houston, Texas; and R. L. Christian, Oklahoma City, Oklahoma.

Frigidaire Division, General Motors Corporation, recently launched what was said to be the most extensive sales management training program in the company's history when

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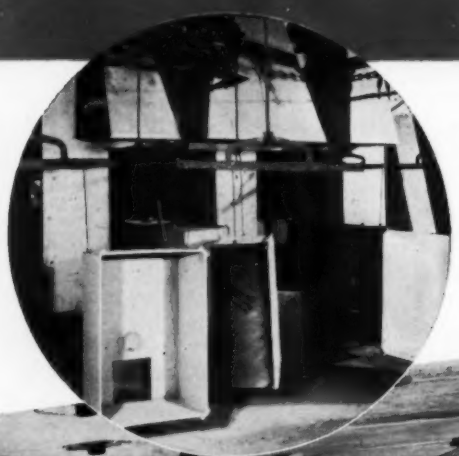
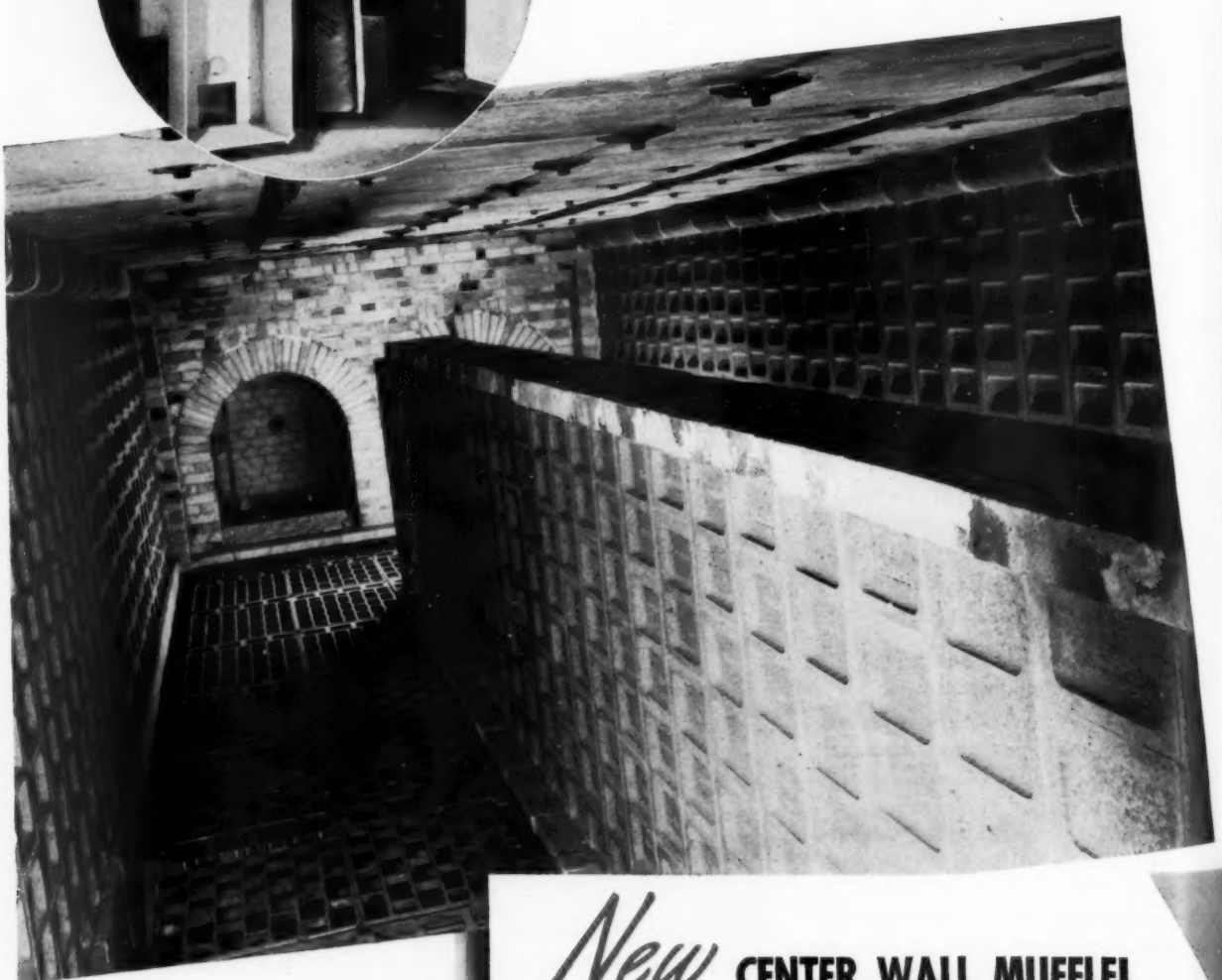
NEWS about Ferro's



Ferro furnace, with center wall muffle, at Westinghouse Electric Corporation, Appliance Division, Mansfield, Ohio. (Photo below shows center wall muffle during construction of furnace.)



New CENTER WALL MUFFLE!

Provides over 40% more muffle radiation area.

newest "U" Type Furnace

with

- *Greater efficiency*
- *Lower operating cost*
- *Longer refractory life*

Still another Ferro first! This time a new "U"-Type furnace with center wall muffle.

This new furnace, designed and built by the same engineers who have constructed more than 89% of all modern Porcelain enameling furnaces, contains an additional 40% muffle radiation area—creating exceptional heating efficiency (through increased utilization of combustion) . . . lower operating cost . . . extended refractory life.

Let Ferro engineers tell you more about this new, tested and proved furnace with center wall muffle. Write today for complete details.

FERRO ENAMEL CORPORATION

4150 EAST 56th STREET CLEVELAND 5, OHIO

→ *from Page 45*

the first ten-day training schools for more than 300 key district personnel got under way in Dayton.

Seventy-five appliance sales managers and district representatives of the 44 Frigidaire distributing organizations throughout the country, together with factory sales department people, were made familiar with Frigidaire's manufacturing and merchandising practices, after a four-year lapse due to wartime conversion. Additional courses are planned for over 300 key district personnel according to an executive report.

Have you increased your carload unit capacity?

One unusual result of the current freight car shortage has been an improvement in packaging and car loading methods.

This result followed redesigning the crate in which the washer is shipped and changing the arrangement of the tiers of crates in the cars. In one instance the Apex Electrical Mfg. traffic department increased the capacity of the largest-type car from 156 to 210 washers. In a smaller car the increase was from 96 to 126 washers.

An added advantage that we didn't anticipate was a 60 per cent reduction in in-transit damage to the washers," said W. F. Nank, traffic department manager. "We eliminated the waste space and in so doing eliminated the possibility of the crates shifting en route."

Apex operating at three times prewar-rate

C. G. Frantz, president of Apex Electrical Manufacturing Co., in the first of a series of letters to be mailed regularly to common shareholders, recently revealed that the company's sales volume is now running at $2,500,000 a month, or three times the prewar rate.

The letter points out that during the first half of 1946 the company's plants were shut down for almost two months due to strikes in steel and other industries, and acute shortages in necessary raw materials. Although heavy losses were sustained during the first half of 1946, the condition has improved from month to month to the point where, during the final quarter of the year, operations were on a near normal basis.

Scheduled rate of production of washers, ironers, and vacuum cleaners for 1947 is approximately 720,000 units. This is based on experience of the past few months, during which production has approached this rate. Such production, Frantz points out, is well within the present capacity of the company's plants.

Among factors contributing to the company's present position, according to Frantz' letter, are favorable labor relations (which seem likely to continue uninterrupted because of the cooperative attitude existing), and a $900,000 plant expansion and rehabilitation program completed in 1946.

Westinghouse to expand Buffalo manufacturing facilities

Plans to expand manufacturing facilities at the Westinghouse Electric Corporation's Buffalo, New York, plant have been disclosed by T. I. Phillips, vice president.

The new operation, formerly a part of the Switchgear and Control Division at East Pittsburgh, will be known as the "Industrial Control Division." To facilitate the transfer, L. R. Ludwig, manager of the Motor Division, has been assigned responsibility for this operation in its present location. Operations at Buffalo will eventually include motor, industrial control, copper wire and welding activities, and will be known as the Buffalo Divisions, rather than the Buffalo Motor Division. Mr. Ludwig will be manager of the Buffalo Divisions.

An additional 1,500 persons will be added to the payrolls at Buffalo when operations are fully under way, bringing employment to 7,200 persons, with an annual payroll of $14,500,000. Mr. Ludwig anticipates $10,000,000 worth of production annually from the new Division. The moving operation will begin sometime in March.

Cleveland to stage Mid-America exposition

Mid-America exposition will be held in Cleveland Public Auditorium from May 22 through 31 to provide a show-window for goods made and used in the central producing area that is bounded roughly by Detroit and Buffalo, Cincinnati and Pittsburgh.

Industrialists, stylists, engineers, builders, purchasing agents and ultimate consumers are expected to study new products and new materials, time and money-saving processes and machinery, presented by the region which claims to produce one-third of the nation's industrial products

and serve two-thirds of the nation's people.

A. W. Steudel, president, Sherwin-Williams Co., is president of the 1947 Mid-America exposition. Vice presidents are Charles J. Stilwell, president, Warner and Swasey Co.; H. P. Ladds, president, National Screw and Mfg. Co.; and C. T. Burg, vice president, Iron Fireman Mfg. Co.

Among the members of the executive committee representing the 80 underwriters of the exposition are: L. T. Blaisdell, commercial vice president, General Electric Co.; Norris J. Clarke, senior vice president, Republic Steel Corp.; and Clifford F. Hood, president, American Steel & Wire Co.

Ferro announces changes in key personnel

manager of frit division

western sales manager

C. D. Clawson, vice president in charge of sales and research, Ferro Enamel Corporation, Cleveland, has announced the appointment of W. N. (Bill) Noble as manager of the frit division.

Noble succeeds Louis Hart, who was recently appointed Ferro's western sales manager, with headquarters at the company's new plant in Los Angeles.

After graduating from the Ceramic Engineering Department of the University of Illinois in 1927, "Bill" Noble served Seeger Refrigerator (St. Paul), Chicago Vitreous Enamel, Porcelain Enamel Institute, and A. O. Smith Corporation. He joined Ferro in November, 1933. During the war, he spent 3½ years with the Chemical Warfare Service, serving as captain in charge of Cleveland Area Office.

"Lou" Hart joined the Ferro organization in 1924, as a service representative. In 1935, he became director of field service, and, in 1943, manager of the frit division.

The new Ferro west coast unit, where "Lou" will headquarter, will manufacture frits, glazes and colors, and will warehouse other Ferro products.

New Erie, Pa., enameling company

News comes to *finish* of the formation of The Erie Ceramic Arts Company, at 423 West 12th Street, Erie, Pennsylvania. The company was formed by H. E. (Eric) Schabacker, formerly president of The Erie Enameling Company.

According to Mr. Schabacker, the object of the newly formed company is to handle small parts which are considered a nuisance to production enamelers. Production would include such items as porcelain enameled dials (on steel or copper), transparent glass signs for gasoline pumps, etc. This development of art enameling is planned.

Accurate Spring again operating

Following a fire which destroyed the main plant of the Accurate Spring Mfg. Co. in Chicago on March 3, Frank D. Weber, president, announces that manufacturing operations have been resumed at 1474 W. Hubbard St., Chicago 22, Ill. In addition, a portion of Accurate's normal output of springs, wire forms and stampings will be produced by company personnel in the factories of other Chicago companies. The company's plant at Fowler, Ind., continues its normal operation it is stated.

Contracts have been let for the construction of a new fireproof building at the site of the old main plant.

Enviable safety record

The 7,000 men and women employed at Clairton Works of U. S. Steel's Carnegie-Illinois Steel Corporation have come up with a safety record that challenges previous performances for safe work in heavy industrial plants.

They've been on the job for three years — that's 40 million consecutive man-hours of work—without a single serious accident.

According to General Superintendent H. W. Sayler, Clairton's safety training is a continuing process. New safety devices and practices are constantly being developed and introduced. Safety principles are incorporated in the teaching of every new operation. Bulletins and literature are devised to catch the workers' attention with new safety slants, and safety meetings are called by foremen.

Window boxes for color says McCall's

A score of well-chosen plants can provide decoration for the house and view from all the windows all summer, McCall's tells its readers in a feature by F. F. Rockwell in a recent issue of the magazine. And if plants are chosen which will bloom for a long period and which grow to a height that fits their use, or can easily be kept trimmed back, window boxes require little care.

Vitreous Steel Products developed a window box of porcelain enameled steel before the war. When steel is

Once

THROUGH IS ENOUGH!

WITH THE

DINGS

DE-IRONER

Slip — whether recovered or new — needs only one pass through the Dings De-Ironer for thorough cleaning by removal of iron particles. This "one-pass" separator has no secret mechanism . . . It is more powerful and does a better job simply as a result of an accurately balanced magnetic circuit having longer coil windings for greater magnetic intensity; and many more lineal feet of stainless steel grid area to catch and hold iron present in the slip. *Dings De-Ironers, size for size, have 20% to 30% greater capacity than any other separators of similar type.*

Write today for full information on the right Dings De-Ironer for low cost, "one-pass" magnetic separation in your plant.

DINGS MAGNETIC SEPARATOR CO.
4750 W. McGeogh Avenue
Milwaukee 14, Wisconsin

De-Ironer Features:

- 20% to 30% greater capacity, size for size, than any other magnetic separator of this type.
- Stainless steel grids—spot welded and heavily chrome plated.
- Open or pressure models available—can be operated top-to-bottom or bottom-to-top.
- Solenoid safety valve, with only one moving part, prevents slip contamination in case of current failure.
- Float valve insures complete coverage of grids while De-Ironer is working.

Coils wound for continuous "High Intensity" operation.

Dings
"HIGH INTENSITY"

"Separation Headquarters Since 1899"

again available for such uses, the porcelain enameled window box may become a reality.

Kitchen modernization film

Mullins Manufacturing Corporation has announced a new Youngstown Kitchen sound slide film which retail dealers can show to prospects or before women's clubs and other organizations.

Entitled "Dream Come True," it shows easy and inexpensive methods to change old-fashioned kitchens into modern, work-saving units.

Anderson Stove appointment

midwestern sales manager

Alfred G. Birkenmeier, vice president of the Anderson Stove Company, Inc., of Anderson, Indiana, announces, through the Anderson Sales Company, Inc., of Irvington, New Jersey, national sales agents, the appointment of Thomas P. Nickell as sales manager of the midwestern territory, including Ohio, Michigan, Illinois, Indiana, West Virginia and Kentucky. Headquarters for this territory will be at 1105 Inland Building, Indianapolis, Indiana. Plans call for an early opening of a display and office in the Chicago area.

Nickell was formerly president of Chambers Corporation. After joining Anderson, he is credited with designing the present line of Anderson gas ranges.

Bathtub weight is theme of Briggs Builders Exhibit

A large scale weighing in a Briggs bathtub at 110 pounds was the keynote of the company's display at the National Association of Home Builders convention and exposition. Other animation added interest to the Briggs exhibit illustrating porcelain enameled steel plumbing fixtures.

Exhibit visitors were invited to sit in a Briggs safety-bottom bathtub, a section of which was cut out to form a seat.

Wirebound Box Association re-elects R. F. Miles, president

R. F. Miles of Chicago, president of the Rathborne, Hair & Ridgway Co., was re-elected president of the Wirebound Box Manufacturers Association, by the board of directors at the association's annual meeting at the Buena Vista Hotel in Biloxi, Miss.

D. R. Simmons of the Elberta Crate and Box Co., Bainbridge, Ga., was re-elected vice president, and L. S. Beale of Chicago, was re-elected secretary-treasurer.

The membership elected two new "rotating" members to the board of directors for one-year terms. They are Foster L. Martin of the Lange & Crist Box and Lumber Co., Clarksburg, W. Va., and Stanley C. Craven of the California Barrel Co., San Francisco.

In addition to Miles and Simmons, re-elected members of the board are, J. B. Adkins of the Adkins Manufacturing Co., Gainesville, Fla.; N. W. Embry of the General Box Co., Chicago; D. R. Gooding of the Wisconsin Box Co., Wausau, Wis.; F. J. Martin, Jr., of the Martin Brothers Box Co., Toledo, Ohio; J. R. Miller of the T. R. Miller Mill Co., Brewton, Ala.; Shelley Schuster of the Great Southern Box Co., New Orleans, La.; and A. L. Whiton of the Chicago Mill and Lumber Co., Chicago.

American Ceramic Society working personnel

This photograph, recently released by ACS, shows the staff of seventeen persons constituting the working personnel of the Society. They are: Front row, left to right — L. E. Ohrstedt, Mary J. Gibb, R. L. Stone, C. S. Pearce, Emily Van Schoick, Virginia Benedict, W. E. Kegg. Back row, left to right — Patricia Grogan, Jayne Kendall, Agnes Wills, Margaret Trautman, Zella Williams, Dorothy Jarvis, Dorothy Holbrook, Helen Burger, Helen Herman, and Ellen Ebie.

Executive changes at Tuttle & Kift

"Deke" Bond heads sales

W. R. Tuttle, president of Tuttle & Kift, Inc., announced the appointment of H. F. "Deke" Bond as vice president in charge of sales.

Bond was formerly assistant to the president of Ferro Enamel Corp., Cleveland (of which Tuttle & Kift is a subsidiary). He has been associated with Ferro in a sales executive capacity for the past 8 years, most recently in charge of new products and new markets development.

vice president–sales

D. B. Kift continues as executive vice president and treasurer of the organization.

George W. Wallace, in addition to his duties as assistant secretary and comptroller of Ferro Enamel Corp., will also assume the post of vice president of Tuttle & Kift.

R. P. Blodgett, formerly chief engineer, assistant to president and works manager, has been elevated to vice president in charge of manufacturing.

T. & K. specializes in electric range heating units, switches, selectors, controls and commercial and industrial heating units.

Important papers at A. M. A. packaging conference

In announcing speakers for the A. M. A. Packaging Exposition and Conference to be held at Convention Hall, Philadelphia, April 8-11, the exposition committee reported that the '47 exposition will require 50% more space than in 1946, and double that of 1944.

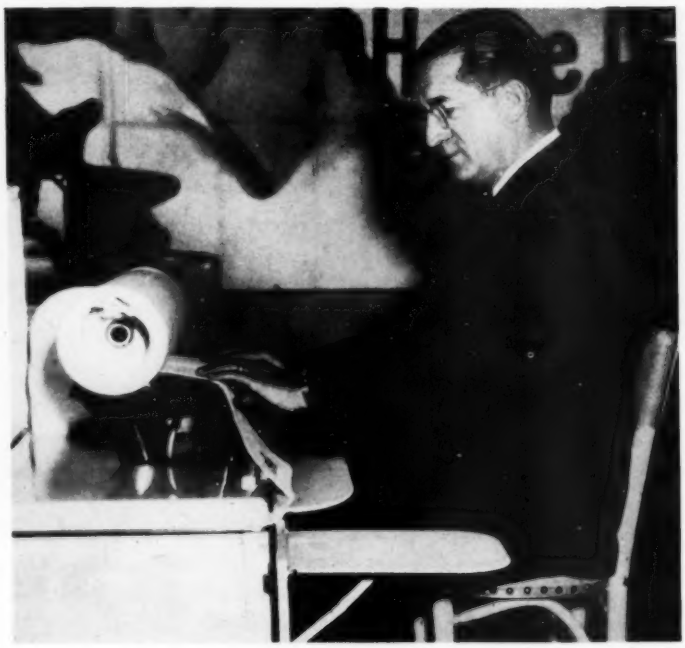
Alvin E. Dodd, president of American Management Association, sponsors of the project, made the announcement and released names of speakers and titles of a number of talks that should be of interest to *finish* readers.

A few selected subjects and authors follow:

Morning Session, Wednesday, April 9—Chairman: J. H. Macleod, vice president, Hinde and Dauch Paper Co., Sandusky, O. "Industry's Stake in the Freight Classifi-

to Page 54 (Column 3)

The boss man shows how it's done



Here we see Judson S. Sayre, president, Bendix Home Appliances, Inc., who is credited with pioneering automatic home laundering, demonstrating that ironing can be a man's job too. He is seated at the new Bendix automatic home ironer. The machine is said to iron "anything." It presses too.

Fights inflation! "I want America to stay economically sound. That's why I'm putting all our extra dollars into U. S. Bonds. It's like buying a share in our country's future prosperity!"

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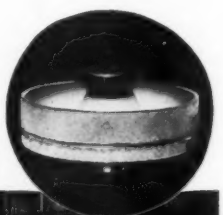
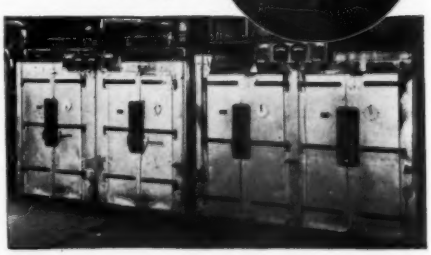


Burdett Installation in Metal Box and Cabinet Co.



Previous *Indirect Fired* time . . 90 minutes.
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Operating Temperature . . . . . 325° F.
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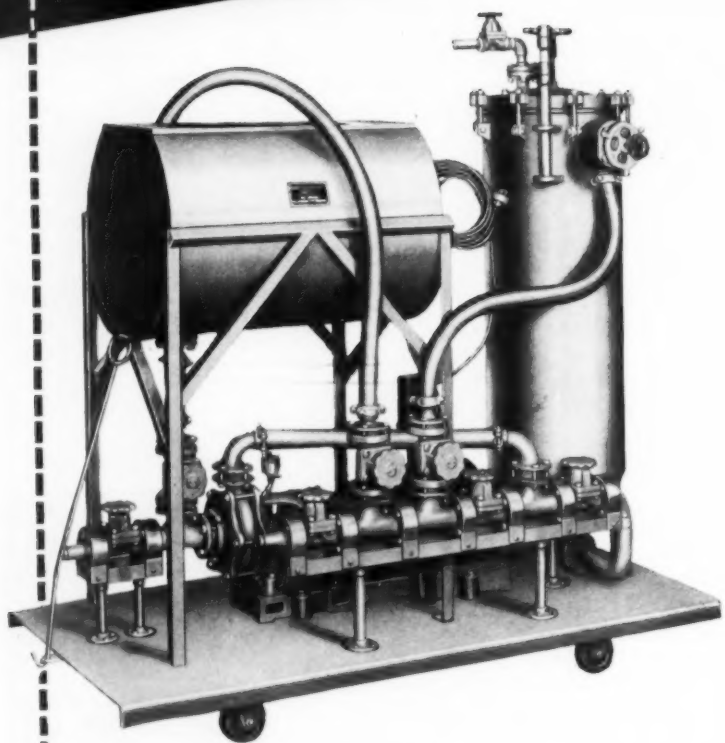

Modern production methods call for dependable equipment. Rejection losses can be eliminated by removing the cause, *impure solutions.*

Industrial Pressure Filters are used by many of the leading enameling plants because they keep the pickle room operating efficiently.

Write for recommendations on the right unit to meet your requirements. Furnished in portable or stationary types.

Automatic Filter powder feeders, special alloy pumps, filter cloth and filter aids.

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→ *from Page 52*

cation Revision," speaker to be announced.

"The Packaging of Metal Parts," by L. A. Holder, packaging committee coordinator, The Timken Roller Bearing Co., Canton, O.

Afternoon Session, Wednesday, April 9 — Chairman: E. A. Throckmorton, president, Container Laboratories, Inc., Chicago, Ill., and vice president, AMA Packaging Division.

"Shipping Container Clinic" — A question-and-answer session. Among the panel of experts are: Wooden Containers — Neil A. Fowler, director of sales research, General Box Co., Chicago, Ill.; Transportation — A. L. Green, special representative, Association of American Railroads, Chicago, Ill.

Afternoon Session, Thursday, April 10 — Chairman: R. F. Weber, manufacturing research department, International Harvester Co., Chicago, Ill.

"Techniques of Export Packaging," by John Mount, Insurance Co. of North America, New York, N. Y.

"Eliminating Damage Claims Through Proper Carloading and Staying," by A. P. Kivlin, assistant supervisor, loss and damage department, New York, New Haven and Hartford Railroad, Boston, Mass.

Repair porcelain enamel — it's easy

The following choice bit was submitted by Harry Richardson, Waterford, Pa., who says it should go along with the "stove leg letters," the "valve handle wheeze," the "left handed monkey wrench," and "snipe hunting."

It comes from page 36 of *Royster's 1947 Almanac* and reads:

"To Repair Porcelain Finishes

"Porcelain finishes for ranges, plumbing fixtures, refrigerators, etc., can be repaired very satisfactorily by the following method:

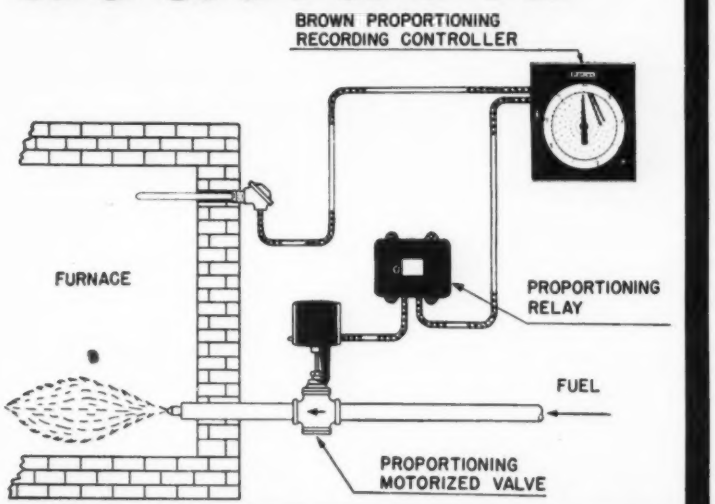
"First, melt some shellac over a small flame, being careful to see that it doesn't catch fire. Then add to the melted shellac titanium oxide until a uniform white mixture is had, after which cast into small sticks similar to sealing wax.

"To repair a *(break)* on a porcelain finish, warm the previously cleaned place and apply the above mixture. Level off, smooth with sandpaper and *finally coat the "repair" with some porcelain enamel."*

Be sure that you don't forget that last operation!

A manufacturer of porcelain enameled cooking utensils is now fusing the company's brand name onto each piece of kitchen equipment during the porcelain enameling process — so that a housewife can identify and reorder with assurance that her utensil purchases will match in appearance and performance.

NOW available



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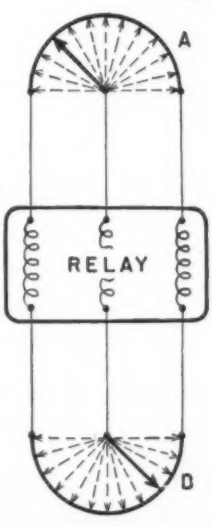

Proportioning Circuit (Pictorial). Electronic Proportioning Controller (A) connected to Proportioning Motor (B).

Now, all the advantages of electric proportioning control are enhanced by the greater accuracy, sensitivity and speed of response of the Brown ElectroniK Potentiometer.

Any application requiring proportioning control certainly needs *continuous balance* measurement — available only in the Brown ElectroniK. Both are needed to do a complete job.

The new Proportioning Control ElectroniK reflects twenty years of experience in electric control design. It incorporates many new and practical features of real value to process control. Smaller increments of valve motion, quicker response and more positive positioning are but a few.

Take the matter of proportioning bands for example. Every instrument is provided with four basic units stepped so as to meet any proportioning band requirement. They slip in and out like a cartridge fuse. What could be more practical?

When you buy the Brown ElectroniK, you get the finest in proportioning controller design.

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BROWN *ElectroniK* POTENTIOMETERS

The properties of porcelain enamel and their effect upon enamelware

(Continued from Page 28)

appears somewhat erratic. With this exception the following is indicated: (1) the upper group of higher thermal shock values consists of either blended or individual ground coats having a good working surface and higher expansions; (2) the lower group consists of ground coats having inferior surfaces and lower expansions; (3) a wider variation in total thickness can be tolerated by choosing the most suitable ground coat.

4. Thickness vs. impact resistance

Impact values for lots 14 - 45 have been plotted in Figure XI in much the same manner as were the thermal shock values in Figure X.

The points representing the impact values also tend to arrange themselves into two rather distinct groups. Lines have been drawn to denote the average of these groups. The points along the lower line are in most cases values obtained from single ground coats while the points along the upper line are, without exception, values from ground coat blends. The values most erratic are those obtained from a blend of ground coats 3, 4, and 5. In Section III, 1, it was mentioned that the surface of this combination was not satisfactory and, since it was weak structurally, may cause lower results.

The fact that blended ground coats fire over a wider range may tend to produce a stronger surface and give higher impact resistance than would be possible from a single frit. Considering the variety of ground coats used and treatment given them, this indication is quite positive.

Editor's Note:

The comprehensive nature of this research, which is being presented exclusively in the ceramic finishing industry by *finish*, makes it necessary that we present it in three parts.

Part 1 (Sections I and II) appeared in March, this issue includes Part II (Sections III and IV) and Part III (Sections V, VI and VII) will appear in May, concluding the series.

We suggest that all finish readers interested in the technical aspects of this work, and who do not file *finish* regularly, clip this series of articles as they appear. You will find references in one section to charts and tables presented in another section, and clipping or filing of the complete presentation will make these references readily available.

Metal preparation for porcelain enameling with a new type spray-cleaning and pickling machine

(Continued from Page 22)

as is sometimes true when parts are nested in baskets. This means absolute uniformity of treatment by all solution and, consequently, uniform pickling of all parts going into the enameling operation. In the past, considerable trouble has arisen in a cleaning and pickling operation due to inaccessibility of solutions to properly clean, pickle or neutralize the contact areas of parts packed in baskets.

Automatic temperature controls on all solutions and absolute control of time in each operation, once the conveyor speed is adjusted, removes the factor of human error, and results in the virtual elimination of enamel defects resulting from improperly pickled ware.

Direct labor savings through the use of a conveyorized pickling unit may be expected. One man is generally required to load the conveyor, one to unload, and one for such maintenance duties as checking solution levels, starting up, shutting down, adding required materials, etc.

Improved working conditions and safety may be expected. Hazards long recognized in today's pickling operations have been centered around acid fumes, splashing and dripping. These defects are removed in the spray units, in which all solutions and fumes are confined to the chamber, eliminating any danger of splashing and dripping. The cleanliness and absence of fumes makes it possible to install an automatic pickling unit in any location convenient to the layout of the plant.

This manufacturer fabricates AND enamels washing machine tubs

(Continued from Page 18)

us that the enamel bisque is thoroughly dried in this unit in about nine minutes.

Ground coat and white fired together in box furnaces

The service conveyor delivers tubs to a point within easy loading distance for either of the electrically heated enameling furnaces. In these two box furnaces ground coat and cover coat enamels are fired at the same time and temperature, either in alternating loads of ground coat and cover coat, or in mixed loads.

The double loading forks are operated individually, as two separate forks. The fork is lined up with the furnace door manually with a wheel crank, but the loading and unloading of the furnace is motor controlled.

Recording pyrometers and controllers are mounted so that they are easily accessible to furnace operators.

The fired ground coated ware is returned to the service conveyor, where it travels to an inspection station, then on to cover coat spray booths, cover coat drying, and back for the finish fire.

At the finish coat inspection station, the tubs are placed on a second overhead conveyor which transports them directly to the assembly division.

A clean, compact plant

An outstanding point of interest in the Horton plant is the degree of cleanliness maintained in the porcelain enameling section. Floors and equipment are clean and remarkably free of enamel dust, which should have a direct bearing on a low percentage of rework due to contami-

Start Right with a FIRM FOUNDATION

A FIRM FOUNDATION is just as important to a porcelain enameled metal product as to the home in which you live. The careful buyer of a building wants the facts concerning the structural strength that can not be viewed from the sidewalk. The careful buyer of porcelain enamel finishes wants to know something of the materials that are under the gleaming exterior finish.

Make sure of durability as well as beauty — "start right from the steel out" with Century Ground Coat Frit. Century ground coat enamels develop the tenacious bond between steel and cover coat enamels so necessary to durability and long lasting qualities in the finished product.

Millions of pounds of Century ground coat frit have proved our claims of smooth plant operation, exceptional bonding properties and low operating cost — that's why producers of some of the country's finest porcelain enameled products continue to use this "firm foundation" year after year.

And remember, when you buy frits from Century— ground coat, cover coat, or special frits of any kind — they are all time-proved in production enameling before they are offered to you. Now is the time to "start right" with a Century ground coat trial. Get the frit with the FRIT MASTERS label.

FRIT from CENTURY FRIT MASTERS

CENTURY VITREOUS ENAMEL COMPANY, 6641-61 S. Narragansett Ave., Chicago 38, Ill.

nation of the ware during processing.

As a result of careful planning of the porcelain enameling division, ware travels from pickle room to assembly line in a remarkably short time and with a minimum of handling. The plant is as completely conveyorized as could be expected of a box-type operation and is extremely compact, the complete enameling division comprising only 9,000 sq. ft. of floor space for all operations.

A. C. S. enamel division program (with authors' abstract)

(Continued from Page 34)

18. *Measurement of Enamel-Slip Consistency by Means of the Brookfield Viscosimeter*

By E. M. Oliver: Research Laboratories, Chicago Vitreous Enamel Product Company, Cicero 50, Ill.

A comparison is made of three methods for determining enamel-slip on two types of enamels. Within the limits of the specific gravity and set investigated, the Brookfield viscosimeter method gave comparable information to the pickup and slump tests.

19. *Effect of Firing Treatment of Ground Coats on Quality of Dry-Process Enamels for Cast Iron*

By R. R. Danielson: Metal and Thermit Corporation, Carteret, N. J., and J. H. Koenig: School of Ceramics, Rutgers University, New Brunswick, N. J.

This work covers a study of varying firing treatment of ground coats and the resulting effect on the quality of adherence and the tendency to blister of dry-process enamels for cast iron. Ground coats composed of one and two frits and with varying raw clay and flint additions at the mill have been used in the investigation.

20. *Determination of Compression Present in Porcelain Enamel on Sheet Iron*

By E. E. Bryant and M. G. Ammon: Ferro Enamel Corporation, 4150 East 56th Street, Cleveland 5, Ohio

A method of determining comparative compression produced in porcelain enamel on sheet iron is described. The method consists of preparation of laboratory samples under carefully selected and controlled conditions and measurement of the warp produced in the sample due to application of enamel on one side.

Data obtained by this method are compared with expansion curves. Several methods of analyzing the curves fail to produce correlation between expansion as determined on frit samples and compression in the porcelain enamel as indicated by the warp of sample plates.

It is concluded that expansion curves on frit samples are not a satisfactory means of evaluating compression in the porcelain-enamel coating on sheet iron.

Thursday Afternoon, April 24

21. *Industrial Utility of Porcelain Enamel*

By James B. Willis: Pemco Corporation, 5601 Eastern Avenue, Baltimore 24, Md.

Although considerable interest in the industrial application of porcelain enamels as protective coatings was aroused in years prior to 1940, many new problems, incident to the war, have accelerated developments of this nature. As a result, there has been a continued interest in porcelain enamels for industrial use. A number of such applications are described together with the problems involved.

22. *Determination and Effect of Sulfur Gases in Plant Atmospheres*

By B. J. Sweo and M. J. Bozsin: Ferro Enamel Corporation, 4150 East 56th Street, Cleveland 5, Ohio

Methods for the determination of sulfur gases in plant atmospheres were devised and analytical data were obtained. The chemical analysis of enamel at various stages of processing indicated that unfired cover coat absorbed sulfur gases and that the degree of absorption was proportional to the time of exposure. This observation was corroborated by simulative test data.

The primary sources of sulfur gases in the plant studied were (1) the burning furnace, (2) the driers, (3) the pickle room, and (4) the compressed-air supply. As a secondary source, the liberation of absorbed sulfur gases from the ware during firing is indicated. The effect of these gases on scumming of cover-coat enamel is discussed.

23. *Spray Drying*

24. *Discussion: What Type of Por-*

to Page 60 →

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MAXIMUM PURITY—MINIMUM CONTAMINATION
FOR ENAMELS AND GLAZES
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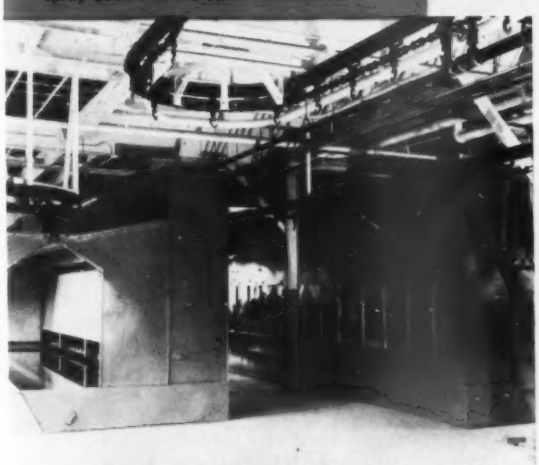
Above: Mahon Filtered Air Supply System in Ceiling of Enclosed Spray Room in the Morton Installation. At Right: Mahon Hydro-Filter Spray Booths in the same Installation.



Another View showing Front and Back of Mahon Hydro-Filter Spray Booths—Morton Installation.

Part of the Morton Plant showing the Complete Finishing System Housed-in at the Right. Note Air Intake Louvers for Filtered Air Supply System.

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The new, modern Finishing System illustrated here, which was planned, engineered, built, installed and housed by Mahon for the Morton Manufacturing Company, is typical of the trend in solving present-day finishing problems throughout industry . . . available space in most plants does not permit efficient planning and grouping of equipment. In this, and several other complete systems installed within the past year, the entire finishing system was built adjacent to manufacturing buildings—the housing becoming an integral part of the system. In some instances where adjacent space was not available, the complete system, or the major part of it, was installed on the roof of the plant. If you have a finishing problem today, or are contemplating new equipment of this type, call in Mahon engineers—they bring to you a wealth of technical knowledge and practical know-how not available to you elsewhere.

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MAHON

→ *from Page 58*

celain-Enamel Research Is Desirable

By E. E. Bryant: Chairman Research Committee, Enamel Division

An open discussion will be held with the following objectives:

(1) To point out research that will expand the use of porcelain enamel.

(2) To clarify controversial subjects or indicate the type of research required to establish facts.

(3) To suggest possible ways of promoting additional research in porcelain enamel.

25. *Pyrometry and Enameling Furnaces*

By Albert J. Biddulph: 11 Holden Road, Penn, Wolverhampton, England.

Central Enamelers Club sets record

(Continued from Page 35)

Under reflectance, an interesting point covered was that titanium enamels reach maximum reflectance between 20 and 27 grams per square foot, and have been used at application weights as low as 17 grams, with a reflectance of 80-82% . . . Some titanium enamels have been tested with a reflectance in excess of 85%.

Dr. Strong pointed to the simplification of color matching with the new type enamels due to the fact that at normal application weights they are not translucent and, therefore, prevent the transmission of color from the ground coat.

Based on the discussion, it would seem that titanium opacified enamels have distinct advantages under many of the nine points covered, and, according to the speaker, come the closest to meeting requirements of an "all-purpose" coating of any material yet developed. He feels that due to the fact that a reduction in coating thickness has inevitably resulted in greater usage of porcelain enamel, a similar result may be expected through expanded use of titanium enamel.

In closing, he dropped this word of caution: "It must be remembered that titanium enamel is a revolutionary development in the art. It presents new and possibly unpredictable problems. Revolutions are not completed over night. Time will be required before all of the questions are answered . . . "

Porcelain enameled housing

The third feature of the program was a color motion picture giving the complete story of the installation of a Higgins Thermo-Namel "motel" unit in New Orleans. A running commentary was provided by "Deke" Bond.

The film showed clearly the use of 8-foot long by 4-foot wide porcelain enameled steel sheets, with spider web backing; the method of separating two of these sheets to form interior walls; and the later pouring of "Thermo-Con" aerated cement, after the steel wall units were in place, to form a solid building unit. The cement used is declared to have a weight of 45% of standard portland cement. The units have been tested at 25,000-lb. pressure per lineal foot.

The porcelain enameling for the

to Page 64 (Column 3) →

The over-center snap action mechanism, an exclusive Robertshaw feature, is actuated by the expansion and contraction of liquid in the hydraulic assembly. The movement of the diaphragm thus created is concentrated on a snap-lever and becomes greatly magnified. Consequently, the control is very sensitive and responds quickly and accurately to maintain very close differentials. Sturdy and dependable, Robertshaw thermostatic electric controls are used widely by leading manufacturers of electric cooking and heating equipment.

MODEL D1

General purpose, double pole, single throw control. No separate "off" switch needed. Capable of standing loads of 6000 watts, 250 volts.

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With automatic selector switch. Designed to control 2 elements either individually or simultaneously.

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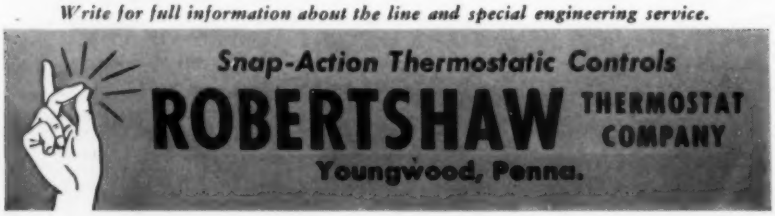
Write for full information about the line and special engineering service.



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Now . . . Today . . . is the time to discuss your Completely Packaged Unit program with our engineers

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Qualified to start small but well established midwestern firm on first time studies, formulae and standard data, experience in porcelain enameling field preferred. Give complete history, references, qualifications and photograph. All replies confidential and will be acknowledged.

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finish
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get
Results

Washington round-up

→ *from Page 38*

Federal Reserve Board's wartime curb on installment credit.

Mr. Davis, speaking in the House, said that Regulation W was inaugurated as a wartime measure, and that emergency having now passed, the restrictions are both ineffective and unnecessary in the national economy as an anti-inflation measure.

The regulations now require a down payment of 33⅓ percent and payment of the balance within 15 months on such articles as cooking stoves and ranges, washing and ironing machines, and refrigerators of less than 12 cubic feet capacity.

The regulations are retarding business activity, Mr. Davis told the House, and make it difficult for many housewives to add materially to the comfort and convenience of their families by purchasing refrigerators, washing machines, and many other items of household and kitchen furniture.

The Federal Reserve Board recently removed the installment restrictions on jewelry and other items but has indicated no intention of an early termination of the curbs on automobiles and appliances.

MORE NEWS —

ACS Pittsburgh section April meeting

The next monthly meeting of the Pittsburgh section of the American Ceramic Society will be held at 8:15 p.m. on Tuesday, April 8, in the Mellon Institute Auditorium. The dinner preceding the meeting is scheduled for 6:30 p.m. at Webster Hall.

Smokeless heaters under test

Commercial models of the BCR Smokeless Heater, a product of research by Bituminous Coal Research, Inc., and a group of 18 stove manufacturers, are undergoing practical field tests in four major cities — Chicago, Cincinnati, Indianapolis and Pittsburgh — and this fact-finding will go on during the present heating season, according to the sponsors.

"Early reports," according to James R. Garvey, BCR development engineer, who is supervising the tests, "indicate that these heaters are giving smokeless performance with high-volatile coals, trouble-free operation, and requires less manual attention than conventional heaters."

The gent who wakes up and finds himself a success hasn't been asleep. — Mitzner

2 WAYS

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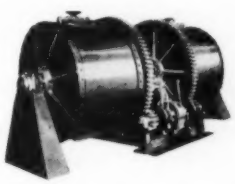

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